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PHYSICAL TRAINING FOR SUPERSONIC FLIGHT DISCUSSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 5, May 79 signed to press 2 Apr 79, No 6, Jun 79 signed to press 28 Apr 79

[Article by Docent R. Makarov, candidate of Pedagogical Sciences: "Physical Training and Supersonics"]

[May 79, pp 28-29]

[Text] During the last two decades when aviation has become supersonic, the overall number of flight parameters being controlled have increased by more than ten-fold but the time, which a pilot has at his disposal to make a decision, has been sharply reduced. Accordingly, the tempo of analyzing the information received by a pilot has increased. In connection with this, neural, emotional and physical strains have grown. They exert a strong influence on the professional activity of flight personnel.

How is it possible to develop an individual's ability to grasp and evaluate a large volume of information in a compressed period of time? Specialists, working on this problem, have established that special types of ground training, in particular, the performance of purposeful physical exercises, contribute to improving the psycho-physiological capabilities of a flier.

Unfortunately, physical training is at times regarded in units as only a way to keep basic physical characteristics at a sufficient level, and psycho-physiological training is considered a secondary matter. Until recently, the physical training program did not provide special exercises for this purpose.

The results of research, conducted in the area of flier special training, is poorly used in some line units and schools. Thus, for example, major attention is devoted to unsuitable physical training sections during the initial training of students.

A questionnaire was sent to pilot instructors, instructional methodologists, and physical training specialists (all told 144 individuals) and the following

replies were received: 138 individuals pointed out that physical training helps flight training, five thought that it had no effect on flight training, and one expressed a negative opinion about physical training. However, all who were questioned unanimously assessed the positive influence of sports games on flight training. As we see, the aviators' attitudes towards sports and physical training are not identical. Meanwhile, many examples testify that physical exercises, supplemented with special training exercises, help to prolong energetic flight activity and contribute to the successful performance of assignments.

In one of the excellent aviation units, physical training and mass sports work are organized with a consideration for the modern demands of flight personnel. Here, the entire command and flight complements have sports ratings. Maj V. Shulebin, for example, is a candidate master of sports in table tennis; Capt G. Torbov--a first-class rated sportsman in volleyball and the militarized cross-country race. Senior Lieutenants V. Polovoy, V. Grigor'yev, A. Demidov and others have proven themselves to be excellent sportsmen. All fliers have a second rating in jogging. They eagerly and regularly engage in special training. This increases their capacity for flight work and their physiological reserve of strength.

It is possible to say the same thing about the fliers in the progressive Military Transport Aviation squadron which officer V. Kuznetsov commands. The squadron commander, himself, already at a sedate age for a flier, performs the rating norms for several types of sports and does not have any medical restrictions. High psychological and physical training help him to endure successfully the factors of a long flight under very complicated conditions. All the fliers follow the commander's example. They spend their free time on the sports fields, in the stadium and water lanes. It is important to mention that the specific nature of the fliers' professional work is taken into consideration both during physical training and during mass sports work.

It has been pointed out that students, who purposefully engage in sports, master the flight training program more quickly and perform complicated flying assignments more confidently than those who limit themselves only to general classes. Thus, a training flight faced student N. Lombarev. The aircraft heeled sharply to the right after leaving the ground during take-off. The young aviator acted energetically and cooly, and quickly brought the machine from the complicated position. Lombarev regularly engages in sports, has a first class rating in table tennis, and takes a great interest in track and field and volleyball. The rapid reactions, coordination, and decisiveness, which had been developed on the sports fields helped him to react instantly to the plane's deviation.

Supplementary basketball training sessions, which included purposeful exercises for developing the necessary qualities, were conducted for two months in one of the flight schools with students who had low indicators in acting swiftly and in distributing attention. After 24 classes the students improved the indicators in acting rapidly by 14 percent, in distributing and switching attention by 12 percent, and in proportioning efforts by 9.5 percent. Their

success in flight training grew considerably. During the next exercises, they spent one-quarter less training time than students who had had similar deficiencies but who had not undergone a special training course.

A group of students, who had to master an intercept using radar equipment, were studied during another experiment. Purposeful physical training helped students V. Moroz and R. Shkuro to master combat applications more quickly compared to students S. Dryabin and V. Gordim. At the moment the target was detected, Moroz's and Shkuro's heartbeat did not exceed 90-92 beats a minute but Dryabin's and Gordim's pulse increased up to 108-110 beats. This testifies to the great tension and, consequently, to the lesser reliability of the body.

In connection with the increased demands on flight personnel and the lowering of physiological resources against the background of the growth in parameters being controlled, it is necessary to improve the selection of candidates for flight schools and treat the professional orientation in military aviation more strictly. An important criteria in a student's readiness to carry out flying assignments is the stability of his mental sphere and psychophysiological functions and qualities, and confident work on the ground and in the air under stress conditions.

Research has shown that the stability of the capacity for mental (intellectual) work and professional work under extreme conditions depends to a significant degree on the psychophysiological reactions to irritants. During special physical training, it is possible to form the moral and combat qualities of a flier, and develop the ability to orient oneself in space and the body's steadfastness when faced with overwork, motion sickness, hypoxia, and excessive pressure.

Having determined their physical and psychological characteristics, it is possible to determine the professional fitness of candidates for flight schools. First, it is necessary to bring to light the potential capability for quick and reliable mastery of the new activity. An occupational diagram which includes the basic qualities that ensure flight training success, such as: distributing and switching attention, fine muscular tone and movement coordination, the ability to alter the pattern of motor actions, a well developed memory and thinking ability, the ability to work when time is limited or scarce, steadfastness when faced with negative flight factors, endurance, strength, and dexterity, must be at the basis of the selection. In addition, the school-leaver must have high moral and will qualities.

Research has also permitted a way to be found to increase selection effectiveness on the basis of physical training. Thus, special equipment helps to determine the status of the basic psychological (physiopsychological) qualities which accompany success in training and the formation of an aerial warrior, and to forecast the improvement and correction of these qualities during flight training with the help of a special program. Experiments, which provided reassuring results, were conducted in one flight school to solve these problems.

Physical training has at its disposal great opportunities in the formation of the flight personnel's psychophysiological readiness to retrain. Special complexes help to improve the mental and physical qualities which are needed in retraining and which ensure the reliable functioning of the "flier-airplane" system.

There is no doubt that physical training and sports occupy an important place in the overall combat training system. Every commander, who is concerned about the high training level of subordinates, must use their possibilities.

[Jun 79 pp 30-31]

[Text] Retraining on a new aircraft, considering its speed and altitude characteristics, aerodynamic qualities, equipment, and armament, leaves its imprint on the psychophysiological training of fliers. A persistent stereotype of control actions has already been created in a flier in the previous aircraft. It is good if the earlier acquired skills help to master the new equipment quickly. However, it happens that the new aircraft is essentially different from the old one, which has already been mastered, in its aerodynamic qualities or because of the reconfiguration of the instruments and control members. Then, the old skills slow down the mastery of the new machine and it is necessary to destroy them. The difficulty of retraining also includes the growing number of operations at high supersonic speeds, particularly in a complicated situation.

The mastery of new equipment is accompanied by significant strain on the body's physiological function. This is expressed in quickened heartbeat and breathing and increased arterial blood pressure. Physical training helps one to adapt more quickly to the new work conditions and to form new professional skills reliably. It has a considerable effect on raising flight safety and combat readiness of flight crews.

From the point of view of adapting to a new airplane, retraining can be conditionally divided into four stages. During the first--the preparatory--one, the basis is created--as it were--forming special psycho-physiological qualities; during the second, they are actively formed and the fliers adapt to the new work conditions. The third stage is direct retraining and the development of flight skills on the new aircraft. During the fourth stage, the mastery of the combat employment of the aircraft and its armament takes place.

It is advisable to plan physical training for the stages as follows. During the first stage, the preference is for general physical training which improves health, increases the body's capacity for work, and improves endurance, strength, speed and dexterity. Special physical training during this time helps to develop distribution and switching of attention, fine muscular tone, and movement coordination.

Special physical training is dominant during the second stage. It forms the ability to work confidently when time is scarce and to alter movements

depending on incoming information, and strengthens emotional and psychophysiological steadfastness when faced with motion sickness, overwork, vibrations, and noise.

During the third stage, general physical training serves as active rest and for the maintenance of a high level of training. Special exercises are aimed at correcting individual psychophysiological qualities if an insufficient level has been detected in them during actual flights. During the fourth stage, physical training is organized in accordance with the distinctive features of the types of combat employment being worked on.

A statistical analysis confirms that psychophysiological indicators are better in those fliers who take an interest in sports games and single combat. The liveliness of their neural inhibition and stinulation processes is higher; they are more even tempered. This helps them to act when time is limited and to alter the pattern of activity. However, sports games have their own stereotypes--several basic conventional elements and tactical principles and this, of course, does not contribute to the professional work of a flier. Therefore, it is advisable to complicate the plans for ball games, relay races, and exercises which have the goal of developing special psychophysiological qualities.

Let us cite several ways to complicate completely available games, for example, basketball. The game is held on a standard court. It is possible to make it more complicated with the help of the following restrictions: play without dribbling the ball; with dribbling but no more than three bounces on the ground; play with only the right hand only permit passing the ball forward. It is possible to introduce one or several restrictions at the same time. In case of a violation, the ball is passed to the rival team.

It is possible to vary a volleyball game by receiving and transferring the ball with two hands only from below or by requiring the ball bounce on the floor after each receipt (except when passing to the enemy side); it is possible to play across a closed net.

Changing the method of playing upon a signal gives a good effect. For example, in basketball: a whistle--play only with the right hand, two whistles--play without dribbling the ball, a voice command--play passing the ball only forward, a new voice command--play bouncing the ball no more than three times on the floor. Each version is used for three minutes and their changing is arbitrary. The team, which violates the restriction rules,gives the ball to its rival.

It is possible to change the method of passing a ball in a circle on signal. The players stand in a circle facing the center at a distance of 1.5 meters from each other. The location of each one is designated by a

50-centimeter circle. When the whistle sounds, the players begin to pass the ball arbitrarily with two hands from above. Two whistles, they shift to basketball passing with their hands at their chest. A handclap--volleyball passing with the hands below. Two claps--soccer passing with the feet, etc. An obligatory condition for carrying out an exercise is the accurate observance of ways to pass the ball without leaving one's position.

In table tennis it is recommended that restrictions in the area of shifting players, the method of playing, and in the direction of passing the ball be used. In the first case, the players are moved in a restricted zone. For example, a 50-centimeter wide corridor is drawn in chalk from the middle of the table. The players must move only in the outlined zone. In case of a violation, a penalty point is assessed. The restricted zone can be drawn on the ground parallel to the extreme edge of the table at a distance of 50 centimeters from it. In the second case, playing is permitted only with the left hand, observing conventional rules. In the third, the condition is established that the ball will be hit only to the right half of the enemy's table (or only to the left). In case of a violation, there is a penalty point.

It is necessary to conduct games using standard or simplified rules at the beginning of the classes and at the end. When doing this, it is necessary to consider the great neural and emotional strain of classes with restrictions and game exercises with complications. The director must dose out the load austerely.

Revolutions on gymnastic (stationary and mobile) wheels can serve to solve purposeful tasks. Against a background of angular acceleration and difficult spatial orientation, the pilot is supposed to determine, as possible, the number and color of flags in the instructor's hand. When doing this, it is desirable to have a collection of flags consisting of six or more flags. The assignment can be complicated using the time for reading-out the information, the mathematical operations with the number and color of the flags in different combinations and in different hands, and by performing the operations depending on the position of the hands or flags. It is advisable to use mock-ups of KPP [command flight] and NPP [navigation flight] instruments, the barometer, and others (with a diameter of 25-30 centimeters). The director places the mock-up in the pilot's field of view at a distance of 4-5 meters while he is turning. The flier must answer questions on instrument readings immediately. Psychophysiological training on gymnastic wheels is included in the basic part of classes and is combined with sports games.

By using the mentioned systems and instructional methods principles, it is possible to form high adaptation mechanisms in the attention and memory functions. The saturated emotional background of the classes, the complication of the exercises with a high reaction speed, and the selection of activity depending on definite situations form psychological steadfastness and the ability to complete movements within rigid time intervals, alter the pattern of motor actions based on the situation which has been created

and the signal received, and to extrapulate the further course of a situation which has been complicated. In this manner, a whole complex of psychophysiological qualities and mechanisms, which determine the success of retraining the most complex of aircraft, is formed.

8802
CSO: 1801

TESTING FOR AIRCRAFT DESIGN DEFICIENCY DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 5, May 79 signed to press 2 Apr 79 pp 26-27

[Article by Col S. Gavrilov, an expert military pilot: "One Millimeter"]

[Text] A telegram arrived in the unit: "During a flight after preventive maintenance, Major Gutsol's crew aborted the take-off. Go for an analysis."

I found out from a short discussion with Maj Ye. Gutsol over the telephone that the pressure on the control stick began to increase drastically during the take-off run at speeds of more than 200 kilometers per hour, and as the speed grew further, it increased so much that the crew commander considered the take-off rather dangerous and broke it off. The crew and the aircraft were unharmed. At the hardstand, they had inspected the aircraft and flap control systems, the operation of the tail fin assembly and the trim--no deviations were detected. They had not been successful in finding out any real cause for the appearance of forces on the control stick.

I had to fly to this airfield in the performance of my official duties. I had thoughtfully compiled a preliminary plan for the analysis and was trying to find the cause of this unusual phenomenon in a guided way. Where was it? In the violation of the aircraft trimming, of the operation of the elevator's Flettner rudder, in a change in the position of the tail fin assembly and the trimming of the elevator, the warping of the elevator's aerodynamic edge? There were many possible reasons. Any of them could cause a large pitch-up momentum. Major Gutsol's training did not evoke any doubts. The firstclass military pilot did not have any gaps; he flew fearlessly and intelligently.

And here is the airfield where this event took place. It was evident from everything that there had been a heavy rain here. The air was literally saturated with moisture. The aircraft was inspected. Special attention was paid to the tail fin assembly and the elevator rudder. The surface of the machine was covered with a film of water, drops of which were falling to the ground.

Specialists from all services certified: "There are no discrepancies."

I walked with Major Gutsol's crew and the specialists to a well designed flying methods classroom. Once again I listened to the crew members and everyone who had prepared the aircraft for the flight and inspected it after the aborted take-off. We also studied the objective control material. It was evident from the KZA [audio monitoring device] entries that at a speed of 200 kilometers per hour, the pilot, having felt pressure on the control stick "toward himself", tried several times to push it "away from himself" and return it to a position close to neutral. When the speed increased further, he aborted the take-off. The other parameters had no discrepancies.

The KZA data received during the take-off of the aircraft which Major Gutsol was flying were checked against the take-off records of similar aircraft with the same flying weight and trim. We did not manage to determine any special discrepancies. However, it is known from the experience of flights in this type of aircraft that it is necessary to pull the control stick "towards oneself" in order to create a take-off angle. What was the cause of the pressure?

Again, an inspection of the aircraft' a check of its alignment; measurements of the angular deviations of the rudders, trim tabs, the Flettner rudder, tail fin assembly, and flaps; and a recalculation of the alignment. Everything was normal. Was it possible that the aircraft commander, having felt a chance pressure, made a hasty decision? Was it possible that the assistant aircraft commander, V. Simakov, had placed the tail fin assembly in a position greater than the take-off one during the preliminary starting up?

I and a representative of the maintenance subunit listened to the conversations of the crew members recorded on the tape. When reading the check list card before the take-off, the aircraft commander reported: "The elevator trim tab and the tail fin assembly are in the take-off position.

I and the on-board engineer instructor, Capt K. Aleksanyan, again went to the aircraft and inspected the tail fin assembly and elevator. We saw the same film of water on their surfaces. The roughness on the skin was smoothed out. Everything, it seemed, was normal as on the other aircraft After the unsuccessful checks, we decided to make several runs with the

aircraft. I took my place in the cockpit of the aircraft and began the first one. Everything occurred as with Major Gutsol. The take-off mode.... Up to a speed of 200 kilometers per hour no peculiarities in controlling the aircraft could be determined. During the second run, I checked the assistant aircraft commander's version about the skin. At a speed of 170 kilometers per hour, I gave the command: "Full stabilizers" and at a speed of 200 kilometers per hour, I aborted the take-off. The pressure had appeared but not as considerable as the aircraft commander had reported.

Senior Lieutenant Simakov, an honest and intelligent flight engineer who had successfully coped with the preparations from the command seat, looked at me in surprise. I understood him: Find the truth using this and experimentation. But there was still no cause.

Meanwhile, the weather improved. The sun began to shine. We again inspected the elevator. The skin is smooth, there are no bends or dents. However, new riveting along the aerodynamic edge attracted our attention. We had not paid any attention to it because of the drops of water which were there during the first inspections. There and then the question arose: "Why the new rivets, the new silver paint?"

We asked the specialists. It turned out that traces of corrosion had been detected on the old aerodynamic edge and they had replaced the edge. We inspected it. The edge was like any other edge--smooth and without bends the entire sweep of the elevator. We measured its deviation--exactly along the axis of the elevator. But how was it fixed? We defined it more exactly. Everything conforms to the maintenance engineering. The edge deviates in the necessary position after a fly-off, but no more than one millimeter. Was this not the cause of the pitch-up momentum?

We examine the crew's actions considering the situation which has been created. In order to compensate for the pitch-up, it is possible to use the elevator trim tabs which are almost in the neutral position during a take-off; move the tail fin assembly from the take-off to the flight position (the zero position on the UPS [standard control panel]); cut back on the engines; and lower the flaps to the landing position. All these operations create a large diving momentum. After a detailed report to the senior command element, I received permission to fly the aircraft.

We take off. The aircraft navigator, Capt A. Delistyanov, reports: "Speed 150,180...." The seconds fly by quickly. The unusual phenomenon appears at a speed of 200 kilometers per hour--the control stick is almost not felt. It is in neutral, but the speed grows. The control stick begins to press on the hands. I squeeze it in order to keep it in the neutral position. It is rather hard.

I pressed the "from myself" switch of the elevator tim tab electrical control and worked the trim tab as far as it would go. The force on the control lever was removed. The aircraft took off. However, the pressure grew with the increasing speed.

I ordered Senior Lieutenant Simakov: "Set the tail fin assembly into the zero position."

He does this. The pressure decreases; however, not so much that it is not felt.

At a safe altitude we cut back on the engines. The pitch-up momentum is almost absent. We circle at the flight altitude. The flaps are in the take-off position. After their retraction, the tendency of the aircraft to pitch up is noticed again. However, it is possible to eliminate it manually. We do not retract the landing gear because the trimming displaces to the rear with its retraction and creates additional pitch-up momentum.

I report the actions to the flight director and ask to land.

During the run, we considered the position of the elevator trim tab (it was completely returned to the "from myself" position). Therefore, we moved the tail fin in bursts to a position close to the landing one based on the degree diving momentum appeared because of the cut-back of the engines and the lowering of the flaps.

And what did we find out? After taxiing in, the elevator trim tab was off by one "toward myself" graduation and the tail fin assembly had shifted one degree less than during a normal landing.

After a careful analysis of what had happened, the specialists deflected the elevator's aerodynamic edge up by one millimeter. The second flight occurred without comment.

Major Gutsol--with time in short supply--had acted absolutely correctly. Thanks to his intelligent decision the plane remained on the ground and the crew was alive and well.

One millimeter. It would seem a small detail. However, the one-millimeter discrepancy on the aerodynamic edge of an elevator which is hardly more than a centimeter wide led to the appearance of such strain on the control lever that even a trained pilot could not cope with it.

8802
CSO: 1801

FLIGHT TRAINING WITH INOPERATIVE INSTRUMENTS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 5, May 79 signed to press 2 Apr 79 pp 44-45

[Article by Lt Col N. Kostyuchenko, military navigator firstclass: "An Unexpected Situation"]

[Text] The preflight preparation was ending. The weather scouts reported that the cloud cover throughout the entire area was complete and even. Its lower edge was at 500 meters and its upper one at 5000. Conditions for landing were calm. The commander decided to fly using a complicated met conditions plan with increased weather minimums, and again reminded flight personnel and the flight control group members on how to act in the event of a temporary break in electronic support or during the unreliable operation of aircraft navigation systems.

"Are there any questions: No. Comrade officers, to your planes!"

This night, the squadron commander, Lt Col I. Vetushko, had to intercept targets behind the clouds during the first flight. On the ground, twilight was already falling when his "enemy" started up. The take-off time of the interceptor also approached.

His report rang out in the air waves: "This is 121, I have turned on the afterburners, permission to take off."

"121, permission granted."

In the air, Vetushko communicated with the command post and, having received the initial data, he concentrated all his attention on the instruments. The aircraft quickly gained altitude. Another instant and it broke out of the cloudy embrace. The evening glow burned low in the west. Its orange playing light was cut by the rays of the sun which was already setting behind the horizon. A magnificent sight! However, there was no time to admire it. The flight controller, Capt V. Kol'chik, gave the command to turn. And soon:

"The target is in front on course...."

A weak blip flickered on the screen of the sight.

The report flew to the CP: "I see the target."

A small turn and ... the screen suddenly rippled and was lit up with bright flashes of light. Vetushko switched the sight to another mode. The blip approached quickly. Again jamming. Once again, it was tuned out, and the target was "locked on". The approach. All the conditions for accurate fire had been created.

"Launch!"

In moving from the attack, Lieutenant Colonel Vetushko set the course designated from the CP. The intercept assignment had been carried out. The film must be excellent--more so since this flight had not offered the experienced pilot, the squadron commander, any special difficulties. He had performed the preliminary preparations as prescribed, and together with the flight controller had firmed up and discussed the procedure for carrying out an assignment to intercept targets under night conditions, actions in special cases, and safety measures when controlling a fighter. Everything had been provided for and played. At least, so Capt Kol'chik thought, observing the aircraft blip on the IKO [plan position indicator] screen.

Vetushko's voice was suddenly heard in the loudspeaker: "This is 121, the arrows of the ARK [aircraft radio compass] and the compass are not responding. Both instruments are inoperative."

The flight controller thought. "There it is! And at a time when it seemed it would be possible to praise oneself for an accurate interception and for a victorious battle."

Flight control group members, located at the command post, the control tower and the radar landing system, are constantly ready to help a crew which falls into a difficult situation in the air. Nevertheless, such a report is always unexpected. It is necessary to immediately tune oneself psychologically to a different work rhythym. Of course, there are back-up instruments on an aircraft. However, everything becomes complicated many times over at night.

Having heard the worried report, the flight director ordered the pilot to fly horizontally in a straight line and instructed the CP controller and the shift landing controller at the RSP [radar landing system] to acquire the aircraft with the inoperative instruments. Silence came to the air waves. However, Lieutenant Colonel Vetushko knew that during this time the specialists on the ground were preparing calculations for leading him to the airfield.

"121, your remaining fuel?"

"There is no reason to be concerned. Only half of the fuel has been exhausted", the pilot thought and reported this to the SKP [control tower]. He was now flying especially accurately. He must not miss a single command. It was necessary to be calm and cool.

Meanwhile, the flight director distributed the CP and RSP control zones, planned a way to bring the aircraft to the glide path, shifted all control equipment to one channel, and ordered the pilot to switch on the "Disaster" signal and test the "Breakers". Using radar intersections, Captain Kol'chik determined the exact flight direction of the interceptor; planned the descent line on the landing course from an altitude of 5,000 meters, and the future position at a distance of 40 kilometers from this line and slightly to the side of the glide angle considering the turning radius; and reported to the director that he was ready to assume control.

Having received permission, the CP controller inquired of the pilot whether there were any characteristic reference points in his field of view. Having heard an affirmative answer, he gave the command to set the speed at 600 kilometers per hour and begin turning to the left 100 degrees. Having understood the concept, Vetushko noticed a cumulus cloud cap to the side and brought the aircraft into a turn with a 30-degree bank to the gyro horizon. He distinctly understood that under such conditions the angular speed of a turn is equal to two degrees a second. This means that 50 seconds are required to turn an angle of 100 degrees. Having completed the turn, the pilot--based on a command from the CP--began a smooth descent with standard conditions, periodically turning the machine at times to the assigned angle. When he arrived at the future position, he was ordered to turn 60 degrees left. Having carried out the command, Vetushko asked about the bearing--he differed from the landing bearing by several degrees. The aircraft approached the clouds. At an altitude of 5,000 meters the CP controller gave the command to bring the craft to level flight.

"121, right-- 10 seconds, lower landing gear and flaps."

In a 30-second horizontal area, the pilot lowered the landing gear, performed the necessary operations in the cockpit, and started to bring the airplane down with the prescribed conditions.

The flight director passed control of 121 to the RSP using loudspeaker communications. The second stage began--control of the aircraft on the descent glide path. The movement of the airplane in altitude relative to the glide path now worried the shift landing controller, Capt V. Kagal, more. To the pilot's inquiries, the direction finder gave a difference from the landing path of several degrees. The error was not great and easily corrected.

"121, bank 15, three seconds."

"Understood, will do."

While flying the aircraft on the landing path, Vetushko concentrated all his attention on accurately maintaining a straight-line flight based on the attitude indicator, and the descent conditions based on the speed, altitude and barometer dials.

The landing controller reported: "121, on course, on the glide path."

The airplane broke through the clouds. The lights of the VPP [runway] appeared to the front.

"This is 121, I see the strip, permission to land."

"Permission granted."

On the ground, the beams of the landing lights blazed up. The fighter was soon running along the concrete. The flight with inoperative navigation instruments aboard had ended happily. Lieutenant Colonel Vetushko reported to the regimental commander about the performance of the assignment and commented on the work of the flight controller and the landing controller.

"Well, Ivan Fedorovich, thanks for the help. Everything went as planned," the commander thanked the pilot and took the microphone of the loudspeaker communications equipment.

"Attention CP, SKP, RSP. The breakdown of the instruments on Lieutenant Colonel Vetushko's plane was simulated. I consider the actions of the teams correct and thank all who participated in bringing the aircraft in for a landing."

Yes, it was an input. Before the flight, the regimental commander talked about it with the squadron commander. No one, besides them, knew about it. Thus, the flight control group received training under conditions of--it is possible to say--an actual breakdown, and underwent a test of their training and ability to provide qualified help from the ground to a crew which has fallen into a difficult situation. The breakdown was only simulated for the pilot. However, if he had to indeed encounter such trouble, Lieutenant Colonel Vetushko would have done everything that was necessary. During ground training days, short exercises, and training exercises, he devotes a lot of attention to the fact that flight personnel learn to operate correctly under conditions of limited air navigation systems, pilot an aircraft using back-up instruments, and operate in special cases during a flight.

Regular training sessions with combat control officers and landing controllers, and short exercises and classes on controller training

contribute to deepening knowledge and working out accurate coordination. However, no matter how firm theoretical knowledge is, it is necessary to strengthen it not only on trainers but also during actual flights so that a pilot can feel everything acutely. In this sense, the input provided the young fliers an opportunity to see for themselves that--when necessary--the teams of the equipment for supporting and controlling flights will always provide effective help to a crew which has fallen into a difficult situation.

8802
CSO: 1801

MEDICAL OFFICER'S PARTICIPATION IN FLIGHT TRAINING DISCUSSED

Medical Officer's Training

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 6, Jun 79 signed to press 28 Apr 79 pp 32-33

[Article by Lieutenant Colonel V. Yadov: "How Did It Fly, Doctor?"]

[Text] The flight was ended. Captain of Medical Services A. Ryabkov got out of the trainer cockpit.

"How did it fly, doctor,"--one of the pilots asked.

"Normally," the doctor answered and he addressed the training instructor--"Give me the critique."

"It was generally flown well. However, you must maintain a more precise descent." The pilot discussed in detail the mistakes committed.

The chief of medical services of the regiment systematically works with the pilot trainer. One would wonder why the doctor is concerned with this. Can it be that he has few other concerns? Such questions occur even to people who are directly connected with flight work.

The activities of an air force doctor are aimed at maintaining flight safety. He participates in the development of high moral-psychological and physical qualities among the pilots. It is necessary to imagine how a pilot operates an airplane, how great a load there is on his attention, and what is the expenditure of moral and physical energy in order to favorably influence the formation of the necessary skills. Of course, one can find out about all of this in specialized literature. However, this was of little interest to him. He wanted to experience everything for himself. So Captain of Medical Services Ryabkov started to become proficient at flights on the trainer.

Ryabkov arrived in the regiment comparatively recently. Before his appointment he successfully completed an up-grade internship "Air and Space Medicine" course. After entering upon duty, the doctor studied, in minute detail, the state of medical services in the regiment. His predecessors left some fine work behind, especially in organizing the monitoring of the state of health of flight personnel and the medical support of flights. But, at the same time, Ryabkov was interested in questions of the psychological health of the pilots and their moral and psychological stability toward various flight factors. For this he began studying social and biographical data, the individual qualities, inclinations and living conditions of the pilots, and their fields of interest.

He started, at first glance, with very little. He held discussions with nurses, medical aides, and personnel of the high-altitude equipment group on the importance of being not only a healthy pilot but also knowing how to excite a positive feeling for the flight in them and of inspiring a professional pride and confidence in their equipment. Now this work has become organized.

The doctor has done much to give the pre-flight examination room an attractive appearance. Now it is warm and comfortable here, there are many colors, but at the same time the furniture stresses the professional use of the premises. The sign over the door "Enter" sets the tone for the strict individuality of the medical examination. Ryabkov begins his discussions with the pilots in different ways, taking into consideration the personal peculiarities of each one. However, he always tries to make sure that the person feels at ease--only under this condition will the pulse and pressure readings be objective. On the whole, a medical examination is an orderly set of measures conducted from the moment the unit commander has decided on flights and up to their completion. The improvement in the medical monitoring of flight personnel is being thoroughly discussed at the instructional council of the regiment to which the doctor also belongs, at service conferences, assemblies, and seminars.

Once the chief of medical service brought up the point that individual young flight commanders, in order that their subordinates would better cope with unusual cases during a flight, tried to exaggerate things. They, apparently, figured that if the pilot considered equipment failure on a flight to be inevitable, then he would become better in sharpening his actions in these cases. This reasoning is patently mistaken. But what was to be done? Should it simply be talked about? This carries hardly any weight. The doctor then decided to thoroughly study the situation. At first he read the regulations and technical descriptions. Then he went to the parking areas, chatted with the engineers and technicians, and participated in classroom exercises. Having obtained the necessary material, the officer formed an objective picture of the equipment used. After analyzing pilot flight mistakes over a long period of time, and acquainting himself with the statistical data, Ryabkov was convinced that at the heart of the majority of mistakes and presuppositions were the incorrect actions of the individual and not equipment failures and that frequently flight mistakes were caused not by the inaccurate handling of cockpit controls, but through a false assessment of the situation and of the incoming information.

After this, at the next instructional methods exercise, the doctor stressed to the wing commanders the futility of such an instructional method and he suggested another psychological course of action. The fact is that at exercises they have not used many cases where technicians and pilots have averted trouble and potential failures through high professional knowledge and the efficient operation of aircraft equipment.

Doctor Ryabkov frequently participates in pilot combat training. He observes their behavior and the coordination of activities. He helps the flight commanders to develop a correct, strictly-individualized program of psychophysical trials, tests, and training exercises to increase the psychological readiness of a pilot for flights.

The development of psychological preparedness for the fulfillment of a specific task--this is an important part of a pilot's flight training. This work is very ordinary in format--planning exercises, and individual and group discussions with the flight staff. However, in order to interest the flight commanders during the discussion to increase the moral and political and combat activity of the pilots, the doctor attempts to show, with concrete examples, what high results a pilot can achieve if he prepares his psyche specifically for each flight. As a rule, he uses analytic materials from recently-conducted flight exercises.

The regimental doctor pays a great deal of attention to the health of the pilot and the engineering and technical personnel. He personally controls all pilot requests for medical assistance. Nothing escapes his purview. He is firmly convinced that there are no trifles in his work. The doctor often talks with flight personnel about the harm in using alcoholic beverages, smoking, and also of self-treatment. Not one illness of any of the pilots goes unnoticed. The regiment's doctor is always with people--on flights, at exercises, and at various social and sports activities. A measurable part of his work is the fact that the personnel of the regiment are confidently carrying out the socialist commitments which they undertook and are successfully executing their assigned tasks.

Comment of Chief Medical Officer

Moscow AVIATSIYA I KOSMONAVTIK in Russian No 6, Jun 79 signed to press 28 Apr 79 pp 32-33

[Article by Lieutenant General of Medical Services N. Rudnyy: "An Expert's Opinion"]

[Text] Before publication of V. Yadov's article "How Did It Fly, Doctor?", the editorial staff showed it to the chief of medical services of the Air Force. Below we present his comments on the activities of the air force doctor.

The initiative of the doctor, the broad scope of his service interests, the striving to study the peculiarities of flight activities and the ability to establish close contacts with flight personnel meet with approval. At the same time one should remember that all of this must be subordinated to the main mission--the clear and effective fulfillment by the doctor of his basic duties which flow from his intention and the medical education which he received. The aviation doctor participates in ensuring flight safety by carrying out general and specialized programs for the Air Force which are directed at preserving the health and high professional fitness for duty of flight personnel. The study by the doctor, within moderate bounds, of the peculiarities of aircraft equipment and pilot activities must lead to the more purposeful planning and implementation of such programs.

Experience shows that a doctor's potential in questions of supporting flight work where he is not a well-prepared specialist must not be overestimated. Not being in a flight profession and not having engineering knowledge, the doctor cannot be sufficiently qualified to involve himself in formulating flight skills, analyzing the results of conducting flight missions and the particular cases and causes of pilot errors, and assessing the reliability of aircraft equipment. Units must have the appropriate specialists including pilot instructors and various types of engineers in order to have a highly-qualified solution to these questions. Doctors must not substitute for these specialists but should assist them by using their professional skills and the data from the medical monitoring of flight personnel.

Specifically, there is no necessity for the doctor's yearning to master pilot skills on the trainer. Since he does not have a flight education and does not fly under actual conditions, he will not be able, with the assistance of a trainer, to reach in flying the level of even a weakly-trained pilot. Conversely, engineers, meteorologists, and other specialists who support flights would have to be trained to experience fully the nature of flight work under various conditions and during equipment failures. However, nobody does this and all functionaries in a air unit support flights within the framework of their specialties.

The peculiarities of flight work, which must be considered in the process of flight medical support, have been stated in detail in the guidance documents and literature on air medicine. Along with knowing the specific types of aircraft and flight tasks, these features can be made more precise through an acquaintance with the equipment of the pilot's work area and the structure and psychophysiological core of his basic work operations. We have flight doctors who have graduated from flight schools and who have flying experience for the in-depth scientific study of the psychophysiological characteristics of flight activities under various flight conditions.

The doctor's participation in the conduct of training exercises on pilot simulators cannot be restricted to observing the behavior and coordination of activities of the pilots. External observation does not permit an objective assessment of the condition and quality of a pilot's activities and this is also hindered by the doctor's lack of personal flying experience. His participation in training exercises can be very useful in that case where he registers and assesses the physiological function readings of the pilots which reflect the level and dynamics of neuropsychological pressure during training. The data obtained by the doctor can help the instructor to more objectively determine the level of the individual state of training, and to bring out the most difficult and inadequately-used elements of the exercise.

The commanders, political workers, and instructor pilots, during their daily combat and political training, are involved in developing among pilots high moral and political qualities and the psychological preparedness for carrying out flights. Doctors must participate actively in this important work, and conduct lessons and discussions with flight personnel on the psychophysiological characteristics of the different kinds of flights, determine methods for predicting the influence of unfavorable factors on an organism, and programs for preserving health and professional fitness for duty. Altitude tests in a pressure chamber, breathing and speech training under excess oxygen pressure and other things conducted by the doctors help in developing the psychophysiological preparedness for flights.

The doctor of an air unit can achieve maximum work results when he continuously improves his own specialized training, and skillfully and persistently uses his medical knowledge in the over-all job of increasing the effectiveness of flying and flight safety.

8524
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TRAINING OF PILOTS IN EMERGENCY SITUATIONS DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 79 signed to press 31 May 79 pp 36-37

[Article by Capt Yu. Andronov: "Lightning Struck the Canopy"]

[Text] Flight success depends on the thoroughness with which the crew is prepared. He who thinks out and plays the entire flight on the ground acts confidently in the air, and he experiences no surprises.

We were flying in complex meteorological conditions. Dense cumulus was hanging over the airfield. Pilots S. Naumov and Lieutenant G. Verkhushkin were returning to the airfield after finishing an assignment as a pair. Suddenly lightning struck the canopy. The mighty force tossed the craft on its wing. The airplane, pushed downward by a descending air current, began to fall in a way that seemed uncontrollable. The lieutenant lost his self-control and began to move the stick and pedals incompatibly. Seeing that the aircraft was tumbling, the instructor took the controls. Acting decisively with the steering rudders, he placed the airplane in horizontal flight and reported the incident to the flight leader.

The pointer of the radio compass jumped about on the scale. A crack appeared on the canopy beneath the periscope. Using back-up instruments, Captain Naumov guided the airplane precisely to the airfield and landed.

What helped him to complete the flight without mishap? His rich experience, without a doubt. But it should be emphasized in this case that this was the first time S. Naumov had encountered such a phenomenon. Consequently the most important role was played by the officer's ability to react quickly to a complication in the aerial situation, and to make the sole correct decision. What is needed here is not only professional skill but also the capability for concentrating oneself to the maximum in a critical minute, to exert one's will, and to mobilize oneself to surmount a suddenly arising danger.

But what about the pilot undergoing the check flight? He also had a good theoretical knowledge of the order of actions in extraordinary situations. But his moral-psychological preparedness for such a situation turned out to be lower. This preparedness develops gradually, as we know, during lessons, preliminary training, preflight training, and in critiques of flights and training sessions.

As with test flights, training flights are vitally necessary to every pilot. Otherwise there can be no discussion of any sort of effective preparation for flights. But no training sessions are alike. What the flight commander practices with his subordinates is very important. But how he does it is even more important.

During one training session the flight commander presented the following scenario input to the pilot: "The aircraft controls have failed after take-off. Eject." The pilot acted instantly. The commander gave him a high grade for his reaction time and the accuracy with which he performed all of the operations. But the grade hardly reflected the pilot's readiness for flying. After all, the instructor had created the conditions himself, and he made the decision himself. All the subordinate had to do was act. And yet it can never be so in a real flight.

Often when a pilot's preparedness for flying is tested, he is asked: "You are flying in the clouds, and your gyrohorizon fails. What do you do?" The pilot decides to fly the craft with the back-up instruments. Everything seems to be correct. But once again in this case the commander told his student where the fault lay, thus guiding him to the correct decision. To recognize failure of a gyrohorizon, a pilot would need much more time than that required to make a decision that begs itself.

We must always remember that every airman needs complete preflight training, no matter what his experience level is and no matter how much training he has received in handling complex and new situations. If this is ever forgotten, the consequences show up without delay.

Captain G. Korniyenko was prepared to launch a missile against a slow target. No sort of complications were foreseen: He was not a green interceptor pilot. The pilot was precisely on course. Just at the right time he reported: "I see the target, and I am attacking!" But a second or two later he reported: "The missile won't fire." The ground controller immediately commanded: "Try your back-up!" But the attack never did take place.

This incident naturally attracted attention. An analysis of the objective monitoring data showed that the pilot, having little time for his approach, violated the order of actions with the armament controls. Following an unsuccessful launch his emotional tension grew dramatically, which affected his thinking negatively. He was unable to correct the "fault" which he himself had introduced (he failed to turn on a switch).

The flight critique showed that the officer was poorly prepared for the exercise, and that he had failed to review the appropriate manuals. Moreover he had not undergone training for a long time, and he gradually lost his acquired habits.

No less dangerous is a crew's indifferent attitude in relation to a familiar exercise in which it counts on an easy victory. Here is an example. The bomber crew reached the bombing range and received permission to begin its run. The navigator opened the hatches. He pressed the bomb release button at the moment the crosshairs fell over the target. The crew commander reported the mission accomplished to the bombing range chief. The navigator's right hand went for the main switch by habit. But he did not feel the click of the spring. The navigator then depressed the test button. A bomb silhouette appeared on the light signal panel. The bomb was still there. They had to make one more run to complete the assignment.

What happened here? Having completed one of the legs of the route, the navigator commanded a new course and began checking the sight settings. The pilot reported that he was on the bombing course. The navigator grasped the switch and answered: "Main switch on." At that moment the pilot asked: "What's your instrument altitude?" Checking his instruments, the navigator replied that they had to climb another 100 meters. During this conversation the navigator's attention was distracted. Now that they were on the bombing course there were new actions to perform and, forgetting about the main switch, he opened the hatches, sighted the target, and pressed the release button.

The cause behind the failure of bomb release is obvious. But the pilot could have double-checked the navigator's actions. Lack of crew coordination is clearly evident here.

In addition to individual professional and psychological training, the unity of the crew, its ability to interact efficiently, which begins to develop on the ground, long before flying, plays an important role in a mission. We must obviously seek the errors in the training procedures to which the pilot and navigator adhered when practicing the habit of controlling the airplane during important phases of the flight. The officers often failed to show up for training sessions, saying that they did not have enough time. And whenever the situation demanded their participation in training, they did not always devote sufficient attention to it. This is obviously why the pilot queried the navigator about their altitude at the wrong time, and why the latter forgot about the switch that kept the bomb from separating from the airplane.

Preparing for an assignment, airmen play out the entire flight in a trainer and in the aircraft cockpit. They develop firm habits of successive actions, making them automatic to a certain extent. And if training is conducted in full volume, errors in actions with the equipment are practically excluded.

It stands to reason that real flight, in which the pilot is influenced by different factors and is inundated by incoming information, differs significantly from flight in a trainer. Practice has shown, however, that training sessions conducted with methodological competency, with a consideration for the individual features of the student, help airmen to prepare completely for all assignments, even the most complex, and to think out the different variants they might assume. Training by the "imagined flight" method brings invaluable benefit. Its principal merit is that by mentally picturing the entire flight in a strict sequence, the pilot also plays out his actions with the cockpit controls. Such training develops his thinking and his ability to quickly reach a needed decision and implement it in response to information differing from what had been expected in the assignment. This is what the overwhelming majority of pilots do.

Pilot Officer B. Divitskiy was to intercept a radio-controlled target. Having meticulously studied the assignment, during his preparation he thought out the several ways in which the target could be approached and attacked. Then he played out his actions in detail, and he thought out the most complex elements of the flight.

Then Divitskiy took to the air. A young pilot was practicing with the target ahead of him. For a number of reasons the latter took too much time, and Divitskiy was forced to work with a stiff time limit. The conditions for his attack turned unfavorable. But the pilot completed a complex maneuver and made a precise strike.

This success came naturally. After all, the pilot had several attack variants in his mind, which he had modeled, calculated, and tested in the trainer. This gave him confidence in his strengths and helped him to attain victory.

Modeling and trainer practice have an important place in airmen training. They help pilots to assimilate the most complex forms of combat application of the aircraft, and to prepare themselves to meet the enemy at any moment and hit him with the first attack.
[010-11004]

11004
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NEED FOR KNOWLEDGE OF FLIGHT THEORY AND PRACTICE STRESSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 79 signed to press 31 May 79 pp 38-39

[Article by Military Pilot-Sniper Lt Col A. Sinikov: "Here Arises A 'However' "]

[Text] It is entirely natural for airmen to undergo periodic retraining in new airplanes and helicopters. Maximum effectiveness could be achieved in this complex process in minimum time only if both the theoretical and practical phases of the training are perfectly organized and conducted. An artificial break between the two phases in time is extremely undesirable. Unfortunately we still encounter a temporal gap between theorectical and practical phases of retraining. Understandably, ground preparations for flight must begin with a repetition of theory in such cases, and this means loss of precious time.

Such a gap often develops for organizational reasons as well. Nothing seems simpler than studying theory and then going on to practice. And yet, as experience has shown, the firmness of knowledge depends significantly on the extent to which it is secured in habits. After all, if a pilot learns the actions to be taken in unusual flight situations by rote but fails to reenforce them with work with the controls in the airplane cockpit and in the trainer, his knowledge would never become firm. This means that as early as in theoretical retraining the pilot must become a permanent resident of the cockpit, reenforcing his obtained knowledge through practical actions. On the other hand some of the very complex theoretical problems associated, for example, with combat application of the airplane and with tactics, would be best studied in the course of practical retraining, just before flights involving new assignments.

The gap between theoretical and practical phases may also be methodological. The pilot must have a very deep knowledge of the aviation equipment that he is operating. His knowledge must be of a volume sufficient for its competent operation on the ground and in the air. This is confirmed by the experience of many generations of airmen, it is written down in documents governing flying, and it is essentially a vital necessity.

But here arises a "however." In principle, a pilot of the Great Patriotic War era was able to become acquainted with his airplane down to the last screw. But modern aircraft are so complex that many specialists must prepare them for flight. A single person is simply incapable of knowing the entire layout of all systems. Moreover there is obviously no need for such knowledge. The term "knowledge of aviation equipment" is experiencing qualitative changes now that third-generation airplanes are entering the units. We must obviously divide the knowledge of aviation equipment arbitrarily into structural (knowing how it is built) and functional (knowing how it works). The objective change we see here is a relative increase in functional knowledge at the expense of structural knowledge.

Thus the requirement to know the aviation equipment in a volume necessary for its competent operation on the ground and in the air means, in relation to a concrete airplane system and its equipment, that the pilot must study the principal of action of the system, he must know what to turn off or on and when, he must know what the result of a particular action would be, and he must be able to determine the cause of a failure occurring in the air, and to take the proper steps to insure successful completion of the assignment in the new conditions.

It stands to reason that this approach to studying aviation equipment would be possible only on the condition that the personnel are afforded a background in engineering. During retraining, we must rely more boldly on the knowledge pilot-engineers had acquired previously in the higher aviation schools. Otherwise the training programs would bog down either in secondary technical details or in repetitions of basic truths, which would mean waste of retraining time and lower training quality.

I believe that these mistakes could be avoided by improving the procedures of theoretical training and by tying theory in fully with acquisition of habits. The role of the flight crew's technical competency is growing continuously. I have simply attempted to turn the reader's attention to qualitative changes occurring in concepts with which we are familiar, and to look at them in a new way with a goal of improving pilot combat skills and flight safety.
[010-11004]

11004
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HELICOPTER FLIGHT TRAINING DESCRIBED

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[Article by Maj G. Chaplygin "The Way the Map is Drawn"]

[Text] In any flight, success would be unimaginable without comprehensive preparation for it, without precise, absolute compliance with the requirements of the documents regulating flying. We, the instructors, recall this constantly to the students as we arm them with deep knowledge in helicopter piloting and develop their firm habits of competent use of the onboard and ground navigation resources at the crew's disposal with the goal of completing routine and other flights perfectly. And I must say that the absolute majority of the future pilots do try to memorize all of the information, instructions, and recommendations brought to their attention in the lessons and training exercises, and that they follow them constantly. This helps the young people to progress in the program more confidently, and to master the secrets of professional proficiency faster.

I would like to single out one problem out of the large complex of problems which students must master in our discipline--making navigational computations and filling out flight documents on the ground and in the air, maps in particular. Students learn the rules and order of this work long before they begin routine helicopter flights. It is very important to them to have the full knowledge of how to prepare maps, make navigational computations, and solve navigational problems, with a consideration of various meteorological and radiotechnical elements.

Life persuades us that he who maintains a serious attitude toward performing various computations in lessons and plots the routes and enters the data on the flight map accurately receives higher grades in routine flights. I recall that I used cadets A. Timoshenkov, V. Kuzyutin , V. Sushchenko, and S. Popov many times as examples as early as in their second year of training. Later in their school career, all four performed with outstanding and good grades in all helicopter piloting exercises (and incidentally, in other disciplines).

We hear many good things in our school about our graduates--communists Cadet R. Sabitov and Junior Sergeant V. Gospod. Also deserving of praise are CPSU member Junior Sergeant B. Chertishchev, party candidate and Lenin scholarship recipient Junior Sergeant V. Beznoshchenko, and Lenin Komsomol scholarship recipient Cadet T. Nikitin. They and many other future pilots are confidently and competently undergoing their navigation training.

It also sometimes happens that as they acquire their initial knowledge and habits, students gradually weaken their attention towards personal navigation training. In earlier times, instructors often had to reprimand V. Serebryakov and V. Parshukov. They worked rather carelessly, and they made significant mistakes. Naturally this had a negative effect on the quality of their helicopter piloting. To correct the situation I told the students about the sad experience of their predecessor, Cadet A. Sryvkov. He assumed a course 50° off the required course during a routine flight. He almost crashed.

We analyzed the incident to determine why it had occurred. We found out that such a gross error was essentially the product of a most inconsequential thing. Sryvkov had written the number 8 on the flight map so carelessly that he took it for a 3 in the air. It was only owing to the high alertness of the radar station operators that he did not lose his orientation. This story had an effect on Serebryakov and Parshukov, and both became more diligent.

Once I found myself talking with Cadet M. Nesterenko just before flying. Checking his flight map, I found it immediately obvious that the future pilot had prepared it formally, thoughtlessly. I posed a few problems to Nesterenko. Using his map he found it difficult to solve them. And yet the situation I suggested was absolutely simple. It is easy to understand that the cadet could hardly have used the map to determine the position of the helicopter in flight, especially in a complex situation.

"How did you determine your radio bearings?" I asked Nesterenko.

"With a navigator's protractor," he said without thinking.

"But the locations of the radio stations are not marked on the map you prepared."

"It doesn't matter whether I mark them on the ground before flying or while in the air. After all, I do know where they are," the cadet answered.

This line of reasoning naturally raised my curiosity. And in fact I found from talking to Nesterenko further that his knowledge of some premises of the manual was rather superficial. Thus he had to be subjected to retesting.

Here is another example. Once the navigator of a training squadron reported a new starting point for a routine flight route during his preflight briefing. Additional time was allocated to make the extra navigational computions. But a check of the map showed that Cadet Ye. Goloskov had not made any changes on his flight map. It stands to reason that the officer testing the future pilot had to ask why.

"I'll do it now," Goloskov answered with considerable embarrassment.

The cadet had a careless attitude towards his obligations. And yet the new course differed from the previous one by more than 20°. This means that definite conditions for a near-accident in the air were already being created on the ground.

Let us very briefly examine the following two incidents. Once I asked Cadet L. Ionychev to tell me what the safe flying altitude would be for a concrete situation I spelled out. It was very difficult for him to answer this relatively simple question on his own. In another case Cadet B. Antonov found himself in an embarrassing position. Once following a flight the future officer was discovered carrying a completely empty flight log.

All of these cases occurred at different times. But they all demonstrate rather graphically that some of tomorrow's pilots divide problems concerning helicopter piloting into main and secondary. Among the latter, for some reason they include work with the principal (in navigational respects) flight documents--the map and the flight log, and performance of navigational computations. They are deeply mistaken!

Of course such comrades justify their erroneous viewpoints by saying that helicopters are outfitted with modern radiotechnical resources. These function dependably, and when employed in conjunction with airfield radiotechnical equipment they can guide a helicopter to a target at precisely the right time in all conditions. (Certain student airplane pilots also reason in this way, as I convinced myself in talks with instructor pilots from other schools. I know that some young pilots in line units also share similar viewpoints.) Were we to accept this line of reasoning, we would have to agree that it is not at all necessary to suffer the pain of making detailed and absolutely reliable navigational computations, or of drawing the flight maps and filling out other documents.

Well, it cannot be debated that our aviation equipment is reliable, including that intended for navigation of airplanes and helicopters. But we must not forget that military pilots are training for battle, and as we know, battle is filled with all sorts of surprises. Even in routine flights a pilot may find himself in a situation in which successful completion of an assignment would depend mainly on navigational computations made precisely on the ground, and on an excellently prepared map.

The students must always remember that no flight is ever the same as a previous one; this law holds true in navigational respects as well. Every

flight always contains something new, and sometimes something surprising. This is why the following immutable law has long been in existence in aviation: Prepare fully for your assignment in the air, irrespective of the amount of knowledge and habits you may have, or the complexity and repetitiveness of the flying. In addition to everything else, this provides a good possibility for developing punctuality, discipline, and accuracy in labor, and other qualities very valuable to a pilot.
[010-11004]

11004
CSO: 1801

CAPABILITIES OF U.S. ATTACK AIRCRAFT DISCUSSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 79 signed to press 31 May pp 46-47

[Article by Col R. Klyuyev based on foreign publications]

[Text] Attack aircraft owe their second birth to local wars, in which ground troops have constantly felt a need for intense air support. However, not one of the airplanes participating in battles "met the conditions of this mission." Light reconnaissance and transport planes outfitted with weapons were vulnerable to ground antiaircraft fire and even conventional rifle fire. Supersonic fighter-bombers, meanwhile, the foreign press notes, were poorly "suited to the dynamic situation of a ground battle, and they were forced to maintain a low speed atypical of them when searching for and attacking targets. Ground fire was as dangerous to them as to any sort of piston-engined airplane. The accuracy of the weapons was also felt to be unsatisfactory; reaction time to a call for assistance from the forward edge was too long, and direct interactionwith a forward air controller performing target indication was unreliable. The loss of one heavy fighter-bomber packed with complex electronic equipment cost dearly. One lost airplane of this sort and two enemy tanks destroyed by it were far from equivalent from the economic point of view."

A-7D attack airplanes appeared in the skies of Vietnam at the very end of American agression in Indochina. Seventy-two of the airplanes participated in combat activities. Each of them carried 24 bombs, and the ammunition capacity of the aircraft's 20-mm Vulcan cannon was 1,000 rounds. The overwhelming majority of their assignments involved isolation of the region of combat activity, and they required a flying distance of 600-650 km. The pilot made use of a Doppler radar set, an inertial navigation system, a cartographic projector, and an ILS--a system displaying the control commands and readings of piloting instruments on the windshield. Together with other features such as an unobstructed view from the cockpit and relatively simple piloting, all of the systems were to insure the required level of the airplane's invulnerability and the accuracy of its target approach and attack.

Tests in a combat situation revealed serious shortcomings in the airplane. The 19-ton attack airplane was found to be too heavy for direct support of ground troops--that is, for action against targets on the battlefield. It was not sufficiently maneuverable and mobile, and its use required large airfields. Specialists also noted that its reaction time to calls from the forward edge was slow, and that the methods of attack could not be varied much.

All missions performed by attack airplanes in Vietnam were arbitrarily subdivided into solo night sorties at low altitudes without fighter cover, and participation in massed raids against North Vietnam in a common combat formation with fighter-bombers at moderate altitudes and with strong air cover. The heavy attack airplanes did not engage in aerial battles. They were never assigned to antiaircraft fire suppression groups, leaving such work for more maneuverable airplanes.

Competitions between tactical aviation subunits have become a tradition in Great Britain in recent years. As an example the American A-7D attack aircraft won a stiff competition against the RAF's Jaguar fighters and Buccaneer light bombers and the USA's F-111E fighter-bombers. On one hand the personnel had some combat experience under their belt, and on the other hand the A-7D's were better suited to the conditions of the competition. They surmounted simulated enemy antiaircraft systems at low altitude better than the other airplanes, they approached ground targets more accurately, and they struck them more effectively. Their simulated losses in defensive air battles were also no greater than those of their rivals, even though they did not possess the F-111E's automatic terrain-following system or the Jaguar's automatic weapon control system.

In terms of the nature of action of attack aircraft, foreign specialists believe training in ground level flying with the aircraft in manual control and in making accurate attacks in extremely short time to be the most important subjects of pilot training. Taking advantage of concealment by terrain when penetrating to a target, avoiding zones containing strong antiaircraft resources, and direct sighting attacks are thought to be the main elements of the tactics of A-7D subunits. Presently there are 1,388 A-7 airplanes of all modifications in the USA, to include 400 in the air force They are all based on the American continent, and they periodically fly, with air-to-air refueling, to Europe for exercises.

The lessons learned in local wars as well as the results of exercises served as the basis for creating a special airplane intended for ground actions at close tactical depth--a maximally simple, dependable airplane that could carry a high, diverse weapon load and would be cheap to produce. Attack aircraft operating within the range of troop antiaircraft resources must, in the opinion of foreign specialists, possess sufficient maneuverability to permit successful evasion, sufficient view to permit the pilot to seek and attack small targets, satisfactory acceleration characteristics within a range of speed from minimum to 700 km/hr, and a low-altitude capability.

Soon the A-10 warplane appeared, which has a maximum speed of 720 km/hr. It carries 4,500 kg of bombs, it has a combat radius of 400 km, and it may remain within the region of combat activities for up to 1 hour. Tests showed that turnaround time at a forward airfield does not exceed 30 minutes; this includes the time required to mount six high-explosive bombs.

A-10 attack aircraft underwent testing in experimental and test exercises. The results of using the new sighting systems and guided weapons were meticulously analyzed, corrections were made, and the most suitable tactics and methods of attack corresponding to the unique features of each of its weapons were determined. The 7-barreled 30-mm GAU-8/A cannon was fired by direct sighting.

The airplane approached its target at ground level, climbed abruptly to 150 meters, and then attacked at a slight downward angle. Bombs bearing braking fins were dropped while in horizontal flight. The tests showed that the line at which the airplane was to climb (or the target itself) had to be marked by signal resources to improve the pilot's orientation and to preclude the need for second runs in search of the target. The most advantageous of the known bombing methods (from the standpoint of accuracy) was that of diving at a 45° angle; however, the airplane remained within the range of antiaircraft resources too long.

When the airplanes flew fire and bombing missions at a practice range (without "countermeasures" by troop antiaircraft resources) the results were as expected: up to 80 percent of the rounds fell within a 5 meter circle from a firing range of 1,200 meters. In exercises where the situation resembled that of combat most closely, accuracy dropped and the airplane's vulnerability increased. The journal AVIATION WEEK reported that the combined defenses of the simulated enemy included surface-to-air guided missiles launch positions, antiaircraft artillery, detection radar, and fire control radar, as well as a squadron of "agressors" flying F-5's controlled from a single command post.

The standard armament carried by airplanes flying missions in the "Red Flag" exercise included 1,350 rounds for the GAU-8/A cannon and two Maverick missiles employing a television guidance system. Because the bases were situated closer to the region of combat activity, flights over "enemy" territory lasted about 30 minutes, rather than the 50 typical of the war in Vietnam. This reduced the probability of encountering fighters and increased the chances of survival within the range of antiaircraft resources.

The objective of strikes by A-10 attack aircraft in the exercise was a large tank column on the march about 60 km from the "front line." Attacking the tanks, the aircraft fired their cannons at a range of 1,800-1,200 meters. The Maverick guided missiles were launched from a range of 7,600 meters, in which case the possibilies for using the missiles were limited by difficulties the pilot experienced in visual target search and identification. When at this range, the aircraft was within the effective range of 23-mm antiaircraft guns (mounted on mobile resources within the tank combat formations).

One A-10 was "knocked down" by a battery of 23-mm antiaircraft guns in the course of the "combat sorties." Target indication radar and optical instruments were locked on to several of the airplanes, but some were able to get out of the effective range before the weapons could open fire, and others avoided being hit by performing antimissile maneuvers.

Recording apparatus showed that another four A-10 attack airplanes had been "knocked down": one by a low-altitude surface-to-air missile complex and three by fighters. Armor does not protect the entire surface of the airplane, and thus questions of viability elicit natural anxiety in the pilots. Exercise observers write that these were the first tests of the aircraft in a complex situation, and that the results may change in the future as experience in conducting ground attack activities and fighting defensive air battles against interceptors is accumulated.

The A-10 uses a laser coordinator in its target search. The method of attack employing the coordinator differs significantly from all known methods of fire and bombing, and it presupposes closes interaction with the forward air controller. On taking off in response to a request for air support, the attack aircraft flies to a holding zone 15 km from the line at which troops are engaged in combat, and it establishes communication with a forward air controller at a ground or aerial target indication post (a light aircraft), from which the target is illuminated by a laser beam.

A-10 attack aircraft recently participated in several exercises in Western Europe in weather conditions typical of this region (clouds, limited visibility). The crews flew at 240-220 meters in about 2 kilometers of visibility beneath the lower edge of the clouds, and they were guided by a ground post. The range of visual target detection was 1,200 meters, as opposed to 1,800 meters over U.S. territory. In this connection, the foreign press writes, it was recognized suitable to make design changes in the Maverick guidance system; in particular, infrared target indication was thought to be more effective than the television guidance system.

Foreign military experts believe that the A-10 will satisfy the requirements of troop fire support on the battlefield and of battle against armored equipment. In all, U.S. war industry had ordered 733 airplanes of this type. They are to be based at English and West German airfields. Formation of the USAF's 81st Wing equipped with A-10 attack aircraft has been completed at RAF Bentwaters and RAF Woodbridge in Great Britain. Out of the 180 craft, the command plans to constantly maintain 40 percent at forward airfields of Western Europe, to be periodically replaced in a rotation program. The attack aviation development program is an inherent part of the military preparations of the USA and the entire agressive NATO bloc. [010-11004]

11004
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TRAINING OF CREW OF LARGE PLANE DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 79 signed to press 31 May 79 pp 16-17

[Article by Capt V. Bondashev, Detachment Commander, Military Pilot 1st Class: "The Monolithic Crew"]

[Text] The crews of multiple-crew aircraft must often perform flying assignments of varying complexity, sometimes more than a thousand kilometers away from their home airfield. The success of their work depends in many ways on the crew's coordination, on how competently the aircraft commander manages the actions of his subordinates in the air, on how well he evaluates the concrete situation, and on how effectively he employs the weapons and defenses.

We know that all members of a crew influence one another mutually in the air. Sometimes the mood of one has an effect on the actions of the others. The sense of partnership is sometimes many times more important in the air than on the ground, especially in a tense situation; in such a case a commander's calmness is a guarantee of successful completion of the flight.

This is why our party organization focuses its attention on nurturing high moral-combat and psychological qualities in the airmen, and on their ideological maturity. Providing effective help to the commander in personnel indoctrination, the detachment commanders utilize many forms and methods of party-political work. For example the aircraft commanders periodically give reports to meetings of the party bureau. Their progress in studying Marxist-Leninist theory, their understanding of the CPSU's domestic and foreign policy, and the effectiveness of their educational work with subordinates are discussed.

Experienced aircraft commanders such as military pilots 1st class captains V. Milyutin, V. Panfilov, and others working with young pilots try to develop their ability to behave confidently and steadily in all conditions. They serve as an example not only of a commander's firmness and adherence to party

principles, but also of endurance and coolness. This produces good results. The airmen of their crews have a high sense of responsibility for the common effort, and they are distinguished by a readiness to come to the aid of a comrade.

Let me cite an example. Senior Lieutenant V. Khramkov, a young navigator-operator, joined Captain V. Milyutin's crew after theoretical retraining for a new type of aircraft. His theoretical knowledge could not elicit any doubts. But the commander noticed that the young officer was not trying to work himself into the collective as quickly as possible, that he was somewhat passive, and that he sometimes ignored the opinions of his comrades.

This caused Milyutin concern. After seeking the advice of communists in the crew, he decided to talk with Khramkov's previous commander and fellow servicemen before talking with him. Milyutin was interested not only in how well Khramkov knew his specialty but also in the relationship he had evolved with his comrades, and whether or not he participated actively in the collective's life, who his friends were, and what his interests were.

After this the commander invited the officer in for a talk.

"Our crew is friendly and unified, like a rock," Milyutin told him. "Try to earn the respect of your comrades in your attitude towards the work."

Either Khramkov did not heed the commander's advice or he was unable to immediately abandon his old habits; in any case things did not go well for him in the air at first, and he did not fit into the collective well. He continued to be gloomy and introverted.

During a long flight the navigator-operator failed to perform his responsibilities with sufficient effectiveness. His shortcomings did not affect the results of the flying assignment only owing to prompt, competent actions taken by the other airmen. The commander reprimanded the officer, and after they landed he tried to find out why Khramkov, who had undergone good ground training, sometimes acted inefficiently in the air. In response to Milyutin's questions the navigator answered in words of one syllable, and even with poorly concealed insult, as if more was being asked of him than he was obligated to give.

"This discussion," the crew commander later confessed, "left a bad taste in my mouth. It seemed as if I was not able to find the right words to persuade the man to change his attitude."

Thus it became necessary to raise this issue at an open party meeting of the detachment. Statements made by communists and members of the crew in which Khramkov served were infused with a concern for their comrade's fate, and with the desire to help him. And the officer responded well to their concern. Perhaps this was the first time in which he felt that his attitude would not earn respect.

Weeks and months of intense combat training passed. There were no more complaints against Khramkov. However, Milyutin continued to persistently follow his development, and during preflight preparations he devoted a great deal of attention to him; he was constantly interested in his progress in Marxist-Leninist training.

The commander's concern did not go unnoticed. Khramkov began to relate more conscientiously to his responsibilities, and he gradually earned the respect and trust of his comrades.

Khramkov's own opinion of those difficult times is rather noteworthy in this connection.

"During my first days in the new collective," he later said, "it seemed to me that the commander and the crewmembers were mistrustful of me. They seemed to say that they had worked themselves in together a long time ago and attained a high level of coordination, and that I was a new person who might fail them. But then I came to understand that I was wrong. First of all I became persuaded of the extent to which the crew commander is respected for his great flying proficiency, his adherence to party principles, and his concerned attitude towards people. He devoted much time and effort to me as well."

Perhaps not right away, but Khramkov did at least come to correctly understand the important features of Captain Milyutin's command style, particularly his desire and ability to work with subordinates. Whenever the commander sees that one of the crew members is displaying initiative, he invariably makes note of his diligence in the flight debriefing and at the party or Komsomol meetings, and he is able to properly evaluate and reward those who excel. In time the commander's words of praise shape the crew's opinion of him and promote creation of a healthy psychological climate in the collective, an atmosphere of friendly, coordinated work and creative enquiry.

"When you see that a person not only performs his responsibilities conscientiously," Captain Milyutin said, "but also tries to improve his knowledge and habits and maintains a vital attitude towards his work, you become convinced that he would complete his mission under all conditions."

Birthday celebrations have become a good tradition in the small combat collective. The crew commander always congratulates the airman warmly and wishes him further successes. Subordinates often turn to Milyutin with the most varied problems, and they come to him for advice. Constantly sensing his sincere, benevolent attitude toward them, they treasure the commander's opinion and the honor of the crew.

Captain Milyutin's crew is leading the socialist competition, and it is honorably maintaining its outstanding title.

As far as Senior Lieutenant Khramkov is concerned, he is now confidently improving his professional proficiency, and he recently became a military navigator 2d class.

As a rule airmen nurtured in such friendly collectives find it hard to transfer to another crew, even if the transfer involves a promotion. But they soon work themselves into the new place.

This is what happened, for example, with Military Navigator 1st Class Captain A. Ryabukhin when he was appointed detachment navigator. He quickly immersed himself into the work and the concerns of his new collective, he found his place within it, and he gained respect and authority among his comrades with the very first flights.

The following case attests to the coordinated, efficient work of our crew, and its psychological steadfastness. Once during the bomber's take-off the airmen found themselves in a rather complex situation. They had only a few seconds in which to display maximum organization, decisiveness, swiftness of reaction, and efficiency. The task was well within their means. Through their competent, bold, swift actions they averted an air disaster and demonstrated high moral-psychological preparedness for flight. The unit commander awarded valuable gifts to all of the crewmembers.

This example once again confirms how important it is to constantly develop, using various forms of political indoctrination, high moral-combat and psychological qualities and the ability to act efficiently and confidently in all situations in the crews of multiple-place aircraft, and how important it is to constantly nurture their sense of partnership and comradely mutual aid.

The detachment's communists are well aware of the fact that party-political work conducted with personnel of flight and ground crews must be distinguished by concreteness and effectiveness. This is why the discussion at party meetings, at meetings of the party bureau, at conferences of party group organizers, and in talks with airmen often turns to the methods of raising party influence on the combat skills of the crews, and to the problems of nurturing high moral-combat qualities in them.

Pepetual contacts with people permit commanders and active party members to determine where they need to concentrate their attention in ideological-political indoctrination of the personnel, and how to develop high moral-combat qualities in the valorous defenders of the socialist motherland.
[009-11004]

11004
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DESIGNER MYASISHCHEV'S FUTURE HIGH SPEED AIRCRAFT DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 79 signed to press 31 May 79 pp 26-27

[Article by Engr-Col P. Astashenkov: "And An Unprecedented Wing Span...."]

[Text] V. Myasishchev's first step toward independence was his appointment as leader of a team brought together to design the R-6--a multipurpose Tupolev scout, a three-man long-range escort fighter, an air "cruiser," a bomber, and a torpedo plane. Myasishchev introduced many improvements into this truly multipurpose airplane. In particular his team attempted to fundamentally alter the location of the oil radiators, moving them to center-wing. Due to this innovation alone the airplane's speed was increased by 5 km/hr, and its ceiling was raised by 300 meters. Not all of the innovations worked, but this experience later bore its fruits.

The R-6 gained its fame not in its military modification but rather in its cargo and passenger modifications in the skies of Siberia and the Arctic. It was aboard an R-6 that pilot P. Golovin completed the first flight over the North Pole before landing the SP-1 expedition.

Myasishchev's obsession with designing heavy aircraft grew even more when Tupolev ordered him to create a giant bomb-bay for his super-heavy six-engined TB-4 bomber, which had double the wing area and payload of the TB-3. It was then that he got the idea of developing and introducing parts made from Cromansil tubes. World aviation had never known bomb-bays of such great capacity. The airplane could lift up to 10 tons of bombs.

In 1936-38 Myasishchev was given an entirely unusual assignment. The Soviet government purchased a license from the USA for producing the Douglas passenger airplane. All of the drawings and technology had to be "translated into Russian." This was not at all a simple task. It is no accident that foreign firms such as Japan's Mitsubishi and Holland's Fokker were unable to complete this task, thus being forced to assemble DC-3's out of machine units purchased on a license and shipped across the ocean. Owing to the persistence and erudition of V. M. Myasishchev and his colleagues we were able to begin series production of the airplanes under the code name Li-2.

Having planned various parts for heavy airplanes, and having accumulated diverse experience in their construction, in 1939 Vladimir Mikhaylovich suggested the bold idea of creating a long-range, high-altitude warplane. His enticing proposal was approved, and the future airplane was given the code name DVB-102 (long-range high-altitude bomber). At the beginning of 1941 it was included in the experimental construction plans. By spring the indefatigable designer not only finished the drawings but also began assembling the first flying model. He hoped to perform flight tests of his long-range bomber in a year. But the Great Patriotic War ruined his plans. Hitler's hordes were threatening the capital. The design collectives had to be evacuated eastward quickly. Myasishchev and his "flying firstborn" left as well. It was not easy to move a huge airplane by land transportation in those days.

The move delayed completion of the work, and it was not until winter 1942 that the DVB left the shop for the airfield. Pilot V. Zhdanov and navigator N. Tsvetkov got it off the ground. The craft enraptured the crew with its flight characteristics, particularly its speed and altitude capabilities. But production of M-120TK engines designed by V. Klimov was behind. Myasishchev then decided to use A. Shvetsov's ASh-71 engines. Considerable finishing operations had to be completed in the difficult conditions of evacuation. The hard work of the designers, test pilots, and producers bore good fruit. In 1942-1943 the airplane passed its test successfully. The air force became interested in it. The Supreme High Commander sent V. M. Myasishchev a telegram stating his gratefulness for the concern Myasishchev showed for strengthening long-range aviation.

Innovations introduced by the designer were what made it possible to achieve the high flight qualities. The two-engined all-metal high-altitude airplane had an original layout, unique equipment, and remote weapon control. It should be noted that two sealed cabins were foreseen for it. Myasishchev was the first in the world to use them. It was not until 3 months after this that the Americans used a similar variant aboard their B-29 Flying Fortress. This was also the first time in our country that the undercarriage of an airplane was outfitted with a nose wheel and struts that folded away into engine nacelles.

The bomb load of the DVB attained up to 4 tons, in which case a 2-ton bomb could be suspended within the fuselage. The take-off weight was close to 18 tons. It attained a speed of 600 km/hr at an altitude of 11,500 meters, and its range was 4,000 km.

While preparing the DVB-102 for production Vladimir Mikhaylovich met Sergey Pavlovich Korolev, who participated in the cabin's development. Both were graduates of the Moscow Higher Technical School imeni Bauman. They grew to like each other right away, and they talked a great deal together about aviation, rockets, and the methods for planning them. Myasishchev readily shared his design experience, and Korolev subsequently began referring to him as his teacher. Soon Sergey Pavlovich was transferred to V. P. Glushko's design office, which was working on rocket engines.

Korolev and Myasishchev once again met after Vladimir Mikhaylovich was appointed chief designer for series production and modification of the Pe-2 airplane on 29 June 1943. It was hard for him to part with his DVB before it got off the ground, but Vladimir Mikhaylovich understood how important it was to replace V. M. Petlyakov who had died tragically, and provide the front with dive bombers, which had found such extensive combat application. The series dive bombers were improved, their production was increased, and 11 modifications of the Pe-2 were created under his guidance. Among these modifications was an experimental bomber with a rocket propulsion unit designed by V. P. Glushko and S. P Korolev, a high-speed reconnaissance airplane, a balloon fighter, a long-range escort fighter, and a long-range high-altitude bomber.

The war ended in victory, and with it ended the era of piston-engined warplanes. Jet fighters went into production in the first postwar years with the participation of design collectives led by A. I. Mikoyan, S. A. Lavochkin, and A.S. Yakovlev. S. V. Il'yushin and his colleagues planned tactical bombers with jet engines. V. M. Myasishchev remained true to his obsession: At the end of 1945 he developed the plans for the RD-17 jet craft with four RD-10 engines. But the work never came to fruition. The Special Design Office was liquidated, and Myasishchev was given charge of the aircraft construction department of the Moscow Aviation Institute.

His DVB-102 airplane, which had survived at Moscow's Central Airport, helped him to return to design work. When the question of introducing sealed cabins in bombers became acute, specialists recalled that V. M. Myasishchev had subjected them to practical testing long ago. Air Force Commander in Chief K. A. Vershinin met with the designer, inspected the DVB, and immediately told Vladimir Mikhaylovich of his idea to create an imroved long-range bomber with four jet engines and, of course, with sealed cabins for the crew. Soon the initiative of the scholar and designer came to be recognized, and it was transformed into a direct order from the motherland.

Intense work began to bubble on the territory of a small aircraft plant in a low sunny building, in which V. M. Myasishchev's Special Design Office was born in 1951. Everything about the future strategic airplane, which had a take-off weight of more than 200 tons, was unusual--the gigantic dimensions of the fuselage and an unprecedented wing span, the bicycle landing gear, and an upward-sloping front section. On 1 May 1952 the last drawing of the craft was sent to the plant from the Special Design Office.

The entire course of experimental production was dramatically abbreviated. Scientific research institutes, mainly the collectives of the TsAGI [Central Institute of Aerohydrodynamics imeni N. Ye. Zhukovskiy], the Central Scientific Research Institute of Aircraft Engines imeni P. I. Baranov, and the All-Union Scientific Research Institute of Aviation Materials, offered creative assistance to the design office. The principal developers of the engines and equipment systems labored selflessly under the guidance of A. A. Mikulin, V. A. Dobrynin, S. K. Tumanskiy, and many others. As a result the design was insured a long life, being a given a guarantee against obsolescence.

Inasmuch as numerous innovations were introduced into the airplane, the designers developed an entire program of ground tests for the machine units and devices. Landing gear was lowered and raised for days on end on one test stand, the strength of joints in response to tremendous forces was tested on another, and the future craft's electric, radio, and other devices were tested on a third. Especially meticulous work was done with the airplane's booster control system, a system for automatically increasing the angle of attack at take-off, and an air-to-air refueling system. This is the first time such systems were used in our aircraft.

By the beginning of 1953 the first stately appearing model was finished. Despite the full confidence of the chief designer and the entire creative collective of the design office, skeptics could still be heard, believing that an airplane of such large dimensions would never take off.

The first flight was to respond to all the doubts. Test pilot F. Opadchiy resolutely taxied the experimental craft for take-off. A cold rain was falling, but almost all design office colleagues were at the landing strip. The first to arrive was an outwardly cool, tall individual in a gray raincoat. This was Vladimir Mikaylovich. He had barely noticed that gray sky appeared between the airplane and the ground before he heard the shout: "Hurrah! It's up!" At the same time everything turned upside down to Vladimir Mikhaylovich's eyes. He had been thrown up into the air by triumphant designers who had worked together with him on the new craft--G. N. Nazarov, V. M. Baryshev, N. M. Glovatskiy, G. I. Arkhangel'skiy, and P. M. Rodnyanskiy.

On 1 May 1954 the huge bomber led an air parade above Red Square. The square met its appearance with applause. And soon the entire world became acquainted with the unique flight characteristics of this airplane and its modifications. In subsequent years V. M. Myasishchev's airplane invariably served as flagship in air parades.

Seven men were sitting in the spacious office belonging to Vladimir Mikhaylovich, who had now attained the rank of General Aircraft Designer. This was test pilot Boris Stepanov's crew. He was preparing to break the record aboard a 201M, and he was reporting the flight preparations to Myasishchev. Yes, all of the computations had been finished. Moreover more than 2,000 iron ingots weighing more than 55 tons had been placed in the airplane's womb. Not a single airplane in the world had ever taken off with such a payload before, or flown into the stratosphere.

The test took place on a murky autumn day in 1959. The heavy craft seemed reluctant to separate from the runway. The crew penetrated the clouds and began transmitting reports to the ground every 2,000 meters.

At the airfield command post, Vladimir Mikhaylovich thoughtfully paced beside the table on which the radio apparatus was located. As soon as the telegraph key punched out an altitude of 13,000, the designer sighed with relief and stepped quickly to the airfield to meet the crew.

The 201M was followed by a heavy craft improved by V. M. Myasishchev's design office, given the code name 103M. It carried a payload of 27 tons. Commanded by Anatoliy Lipko, the crew traveled a 1,000 km route with this payload at an average speed of more than 1,000 km per hour. In all, 19 world records were set aboard brand M airplanes.

On 5 November 1959 PRAVDA wrote: "Attaining outstanding results, Soviet airmen expressed their sincere gratefulness to our designers and aircraft builders, who created fabulous airships."

General Aircraft Designer Communist V. M. Myasishchev now had other things to worry about. His collective had built a new airplane, the M-50, and Hero of the Soviet Union Pilot N. Goryaynov was making ready to test it. Spectators gathered together in Tushino on 9 July 1961 to see the remarkable creation of Myasishchev's designer talent--an exceptionally beautiful and mighty supersonic strategic missile carrier. Academician A. I. Makarevskiy had this to say about Vladimir Mikhaylovich: "An especially significant result of his activity as one of the outstanding aircraft designers was the first intercontinental high-speed heavy airplane with jet engines developed under his immediate supervision." Missile carriers of Myasishchev's design are now organic to our long-range aviation, and those that serve as tankers help other airplanes to surmount intercontinental distances.

Vladimir Mikhaylovich then devoted 7 years to aviation science. From 1960 to 1967 he directed the world-renown center of aviation research--the TsAGI, which had been founded by N. Ye. Zhukovskiy with the support of the great V. I. Lenin. Then he returned once again to design activity, working on bold, futuristic plans. Academician V. V. Struminskiy described this time of Vladimir Mikhaylovich's life well: "V. M. Myasishchev continued to fruitfully combine his design activity with new explorations in aviation science and with assimilation of new aerodynamic profiles, new structural materials, and new ways for raising flight characteristics." Indicative from this point of view was Myasishchev's development of an experimental supersonic aircraft employing the most progressive materials in its structure.

General Designer V. M. Myasishchev devoted every instant of his time to thoughts of aviation and of future airplanes. I was persuaded of this several times in my meetings with him. Once I drove together with him from the Special Design Office to the TsAGI. On the way, Vladimir Mikhaylovich did not say much, drawing something in his notebook. When we arrived I asked him what he was doing.

"Oh, I was just amusing myself with ideas about how best to cover the distance from Moscow to Vladisvostok in 1 hour," Myasishchev replied with a kind smile, his face exuding youthfulness.

Vladimir Mikhaylovich pondered for a minute, and then he continued enthusiastically:

"Imagine a heavy airplane rising into the air carrying a rocket glider. Let's assume it climbs to a flying altitude of about 30 kilometers, where it flies at four to five times the speed of sound. At a certain moment in time the pilot of the rocket glider turns on his own jet engines; then, slipping off the carrier's platform, the winged 'passenger' climbs forward and upward. There is only a few minutes of fuel in the rocket glider's tanks, but this is enough for the glider to climb another 60 kilometers and accelerate to 10,000-12,000 kilometers per hour. This is followed by gliding flight. Utilizing the kinetic energy of the glider and the lifting force of the wings, the pilot would reach his destination and land on the east coast exactly an hour after his Moscow take-off."

Yes, the talented designer of winged giants came up with many unusually brilliant ideas. On 14 October 1975 death brought his bubbling activity to an end. But the outstanding aircraft designer left to us his remarkable airplanes and his bold ideas, which are now being successfully brought to life by V. M. Myasishchev's numerous students and successors.
[009-11004]

11004
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PROBLEMS OF FLYING IN STORMY SUMMER WEATHER DISCUSSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 79 signed to press 31 May 79 pp 30-31

[Article by Military Pilot 1st Class Col V. Shagov and Engineer-Colonel V. Nikitin: "Lightning Is No Joke"]

[Text] The warmest month of the year--July--is commonly referred to as the climax of the summer. Thunderstorm activity achieves its maximum over almost the entire territory of our country in July and August. This is also the time we observe the highest frequency of development of thick cumulus and cumulonimbus.

Today you can hardly find a pilot, and all the more so an aircraft commander, who does not understand the complexity and danger of flying in such clouds and who is ignorant of the fact that such flying is categorically prohibited. This is why intentional entry into cumulonimbus is a practically nonexistent phenomenon in the air force. And yet pilots may still enter such clouds unintentionally.

An analysis of such near-accidents revealed several causes. The principal ones are a superficial assessment of the meteorological situation by some commanders and flight leaders, their lack of attention to weather reports, and incorrect and untimely organization of weather data collection. As a result airplanes and helicopters sometimes are allowed to fly when it is difficult and on occasion impossible to avoid thunderstorm activity. Another reason why crews find themselves in thick convective clouds is the flight crew's inability to identify the danger of approaching clouds in time or to competently maneuver about them. And, finally, we can cite the poor quality of some weather forecasts written by meteorologists, and late and imprecise warnings of thunderstorm activity to flight leaders.

Experienced aircraft commanders and flight leaders confidently evaluate the preflight synoptic conditions with the goal of determining the possibilities for development of thunderstorm activity during that flying day. Officers B. Antonov and G. Belov, who are experienced flight leaders, devote serious attention to evaluating the meteorological situation. Analyzing it with the

help of synoptic and aerological maps, they determine whether or not development of thunderstorm activity is possible. An OT 500/1000 relative topography map provides considerable assistance: If it shows an enclosed area or trough of cold air above the flying region, the conditions for development of convective clouds are obvious. On the other hand when an area of warm air is present, the conditions for development of convection are absent.

But flight leaders know quite well that analysis of just an OT 500/1000 map is not enough: It provides information only on the thermal state of the middle troposphere. We would need a ground synoptic map in order to evaluate the condition of ground air layers and the effects of atmospheric fronts. We know that thunderstorms are observed most often in an area of weakly pronounced growing cyclones and troughs, on atmospheric fronts and, in a number of cases, on the southwestern and western peripheries of anticyclones, while they are rare in the centers and on the eastern peripheries of anticyclones as well as on crest axes.

Officers of the units under discussion here test their conclusions concerning possible development of thunderstorm activity, made on the basis of aerosynoptic materials, with the help of an aerological diagram--a graph that can be used to evaluate the thermodynamic state of the atmosphere by computation this time, rather than qualitatively. Presence of layers on the graph with high positive energy of instability (these are colored red) is a dependable sign of forthcomirg development of convective clouds.

Concluding the evaluation of the meteorological situation, one must mandatorily analyze the thunderstorm prediction computations made by the on-duty meteorologist.

On concluding that thunderstorm activity may develop in the course of the following shift, the flight leader and the duty weatherman take steps to insure flight safety in meteorological respects. What they do depends on the concretely evolved situation, but experience shows that their responsibilities should be: inclusion, in the preflight directives for the flight crews, of recommendations concerning intensification of their wariness, the methods for promptly detecting convective clouds and the rules for avoiding them, and the order of reporting discovered cumulonimbus and thunderclouds; organization of aerial and radar reconnaissance, clearly distributing zones of responsibility between different radar crews; determination, in accordance with the concrete synoptic situation and the nature of the planned flights, of the limits to which thunderstorm activity and cumulonimbus could spread before flying would be limited or terminated; provision of an operational summary of weather data, especially for standby airfields.

During the flights an experienced leader constantly monitors development of convective clouds and systematically organizes aerial and radar weather updates.

Thunderstorm centers and thick cumulonimbus concealed by clouds of other forms--stratus, stratocumulus, altostratus, and the like--are very dangerous. It is extremely difficult and often totally impossible for a pilot to detect them visually when flying beneath clouds, between cloud layers, and especially through clouds. Therefore, making his decision to update the weather forecast from the air, the flight leader must give clear instructions to the reconnaissance crew concerning the use of onboard radar sets to find "camouflaged" thunderclouds and thick cumulonimbus, and, when possible, to fly over the tops of the concealing clouds. In this way pilots would be able to find the tops of thunderclouds and thick cumulonimbus within a considerable area. This would mean that steps could be taken to prevent entry of crews into hazardous zones.

Radar weather reconnaissance plays a very important role in prompt detection of thunderclouds and revelation of their direction and speed of movement. Such reconnaissance should be performed with conventional radar stations, radar altimeters, and landing radar systems in addition to special meteorological radar stations (MRL). The duty navigators and duty officers of the meteorological service must monitor meteorological phenomena on portable displays set up in the command post. And if portable displays are unavailable, radar station and landing radar system crews do the job. Radar weather reconnaissance is performed with devices intended to suppress radio echoes reflected from atmospheric disturbances turned off. Such disturbances are sought first with the lowest sweep scale, corresponding to the maximum range of the radar station. First the antenna tilt would best be set equal to -2°, subsequently being gradually increased to (+3)-(+4°).

It is very important to correctly determine the direction and speed of moving meteorological phenomena. The often-employed method of determining these parameters on the basis of an evaluation of two successive positions of the radar return does not always produce an accurate impression of the center's movement relative to the airfield. This happens when the distance of the leading edge of the center from the point of reckoning changes not only due to its horizontal movement but also due to change in area. It would be suitable to determine the rate of movement of the radar return on the basis of two successive positions of its center only when it is moving along a line passing through the center of the plotting board, and when the area and configuration of the return undergo significant change.

But if the line along which the center of the return moves does not pass through the center of the plotting board, we proceed as follows (Figure 1). A line OA is drawn from the center of the plotting board O parallel to the line joining the two successive positions of the center of the return. If this line intersects the outlines of the returns, we measure the distance ΔL between points C and D, at which line OA intersects with the return edges closest to the center of the plotting board. The resulting value for movement of the return relative to the airfield is divided by the time interval between the observations. If line OA does not intersect the outlines of the returns (Figure 2), we determine ΔL by dropping perpendiculars from this line to the points on the return outlines closest to the center of the plotting board, E and F.

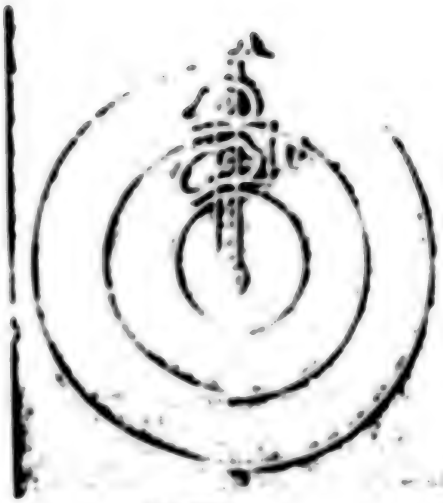

Figure 1

Figure 2

The first two cases correspond to situations in which the center or periphery of a cumulonimbus is over the airfield. In the latter case the cumulonimbus bypasses the airfield, assuming its area does not increase. However, before we can make a final conclusion we would have to carefully evaluate how the area and configuration of the radar return has changed, and extrapolate its behavior to the period during which the cloud would be passing by the airfield. It should be considered in this case that the area of the projection of a cumulonimbus is always greater than the area of a projection of that part of it which produces the radar echo (return). The difference in radii of the projections of the cloud and its active zone may be as much as several kilometers.

The intensity of weather phenomena is judged on the basis of the brightness of the return and the clarity of its borders. Individual developing thunderclouds and thick cumulonimbus produce a clear signal with clearly delimited edges. Thunderclouds concealed by clouds of other forms, meanwhile, produce a return with a diffuse outline. The brightest part of such a return would correspond in the latter case to the location of the thundercloud. The brightness of the return is inversely dependent on the range of its detection. This is why all returns detected at ranges of 100 kilometers and more should be interpreted as well-developed cumulonimbus or thunderclouds.

The most complex situation arises when thunderclouds and cumulonimbus begin to develop right within the airfield (flying) area. In this case the task is to detect the returns on the display in time, and to subsequently monitor changes in their intensity. It is very important to spell out the periodicity of radar weather updates. We know that given favorable conditions, a cumulus may grow into a large cloud in 30-40 minutes (this corresponds to an average vertical velocity of about 1 meter per second for the convective current). Consequently in a situation promoting development of convection, following the appearance of the first cumulus its development must be monitored by radar not less than every 15 minutes.

It was recently established that significant wind shifts (abrupt altitudinal changes in speed and direction) are observed in the outskirts of a developed thundercloud in the ground layer. Cases in which the air speed of an airplane has decreased in response to wind shift by 25 km/hr in 2.5 sec and even 77 km/hr in 5 sec have been noted. When combined with intense descending currents, which are also often observed near a thundercloud (especially in its rear), such changes in the air speed of an aircraft making a landing approach may create very difficult piloting conditions. As an example a Boeing-727 crashed at Kennedy International Airport on 24 June 1975 following entry into a zone of shifting winds. One hundred thirteen persons died.

Practice has shown that when a cumulonimbus approaches, the zone of significant wind shift is situated most often in front (in back when the cloud is moving away), on the order of 10 kilometers (up to 25 kilometers in certain cases) from the border of the radar echo. Therefore a pilot making a landing approach toward an approaching thundercloud (or behind a thundercloud moving away) may encounter a dangerous situation even when he is 10 kilometers from the airfield. This circumstance must be considered by the flight leader when he determines the time to terminate flying due to an approaching thunderstorm.

The duty weather forecaster is the flight leader's closest assistant in evaluating the meteorological situation. He is obligated to constantly keep his hand on the "weather's pulse," and to give adequate warning to the unit command concerning the time of arrival of thunderclouds or cumulonimbus in the airfield (flying) area. We do not presently have reliable direct methods for forecasting the start of thunderstorm activity . It is usually determined indirectly on analogy with the previous day's conditions or on the basis of the typical forecasts for the airfield area. Naturally, significant errors could be made in this case, both in the direction of earlier development of convective phenomena, and in the direction of greater development time.

We can pinpoint the time at which cumulonimbus begins to develop by considering the time at which a temperature T_p, at which inversion in the ground layer ceases, occurs on the ground. For this purpose we draw a dry adiabatic curve from a point on the aerological diagram corresponding to the upper limits of ground inversion to its intersection with the isobar corresponding to ground pressure, and then we use this point to read T_p. Utilizing the daily temperature table for the given month, we can determine the time at which temperature T_p would occur. It would correspond approximately to the moment the first cumulus appeared, and 60-90 minutes later we would expect development of air-mass cumulonimbus.

During the flying the duty weather forecaster carefully analyzes the aerial and radar weather reconnaissance data and information from neighboring airfields and various meteorological stations on the current weather and thunderstorm phenomena. He devotes special attention in this case to prompt and complete acquisition of data on weather at standby airfields. Consultation with interacting weather offices and weather offices at higher levels may provide considerable assistance to the duty weather forecaster in his assessment of the meteorological situation.

Efficient coordinated work and establishment of complete mutual understanding between the flight leader, the duty weather forecaster, and the command post and radar station crews would be a guarantee of meteorologically safe flying at the time of developing thunderstorm activity.
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AVIATION MAINTENANCE METHODS AND RESULTS DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 79 signed to press 31 May 79 pp 32-33

[Article by Guards Engr-Maj V. Vysotskiy: "There is No Limit to the New"]

[Text] The summer combat training period is at its busiest. In these intense days, the roar of engines rarely abates in the flying zones and around the airfield. The flight crews are working on complex tasks in the sky. Personnel of the air force engineering service are constantly concerned with the dependability of the aviation equipment on the ground and in the air.

The collective wisdom of IAS [air force engineering service] specialists is contributing many new and valuable things in our unit. This is graphically evident in the work of the engineering-technical section of the instruction methods council. Its activities are aimed at introducing useful innovations and the best experience, and at constantly increasing the quality with which airplanes are prepared for flying. Special attention is devoted to improving surveillance over the condition of aviation equipment.

Deep daily analysis and precise compliance with the established rules for operating the aviation equipment have significantly raised the effectiveness of job-by-job control. Recently in a meeting of the technical section of the instruction methods council, in which the most experienced specialists participated, we once again polished up the list of jobs to be checked, and we turned the attention of the maintenance group chiefs, the detachment technical maintenance unit chiefs, and squadron deputy commanders for IAS toward intensifying surveillance over aircraft preparations for flying in the summer training period.

What more can I say? Job-by-job control had worked successfully in our unit for a long time. But active work is also going on with the purpose of improving control. Thus the most critical jobs common to all IAS specialists were defined. They include first of all those jobs involving the use of monitoring apparatus, determination of the correspondence of the parameters of the equipment and their precision characteristics to the prescribed values, ascertainment of the dependability with which apparatus is installed at the workplaces, and closure of hoods, hatches, and cowls.

Without a doubt the experience of operating the aviation equipment also increases with every day of flight training. This introduces significant changes into the volume of job-by-job control; it requires specialists to maintain high technical excellence and exactingness in their work on aviation equipment. Instructive in this regard is the practice followed by specialists in the maintenance group headed by Guards Captain of Technical Service P. Rybitskiy. In the initial period of assimilation of new equipment, the personnel of this group monitored fulfillment of all items on the repair job list, beginning with disassembly, assembly, and lubrication, and ending with inspection of the precision characteristics of the apparatus. The flow sheets were bristling with notes marking the items that had to be checked. Of course it was not easy for the group chief to maintain such control to the fullest extent. But Communist Rybitskiy did his job without fail. Nor has the monitoring volume decreased at all today. But what the group chief does, for example, is to place inspection of new equipment under special observation and order his senior technician to check the other systems and machine units.

The instruction methods council's section also discussed organization of control over special equipment preparation. All operations performed on it had to be monitored continuously. The instruction methods council generalized the experience of the group headed by Guards Captain of Technical Service A. Tarasenko. His subordinates are united into several technical subgroups. Each of them performs planned jobs using modern apparatus at its own workplace under the supervision of an experienced senior technician of the group.

The specialists record all values of the parameters they measure in a parameter log. Having an excellent knowledge of this system, Guards senior lieutenants of technical service B. Medvedev and A. Agibayev always confidently place their signatures on these logs to indicate that job-by-job control of preparations of the apparatus for flying had been performed.

It stands to reason that the list of jobs subject to control is not something constant. All the more so because problems that attract the attention of specialists and require intensified control over the machine units sometimes arise in certain systems during the equipment's operation. This task is entrusted to the most experienced officers, ones having high technical knowledge and good habits, and able to perform a deep analysis to precisely establish the cause of the trouble.

Once during preflight preparations on one of the airplanes deviations were discovered in the work of the speed and altitude indicators. Looking for the causes, the engineers established that during initial preparations an aviation equipment mechanic forgot to plug in the static and dynamic wiring after changing an instrument, and the officer checking the quality of the work failed to note his subordinate's mistake. Analyzing the incident, the officers recalled that something similar had once happened earlier. But the problem had not been brought to the awareness of either the mechanic or the technician at that time. There could be only one conclusion: communication was poorly orgainized. Concrete steps were taken to improve it.

In particular this problem was discussed at a meeting of the instruction methods council. The squadron deputy commanders for IAS and the maintenance group chiefs were asked to turn the attention of specialists in lessons and technical critiques to the actions they had taken during preflight training, and to go more deeply into the mistakes made by the personnel operating the aviation equipment. On the initiative of the engineers, the unit has now organized an album that is serving as an effective aid in preventing repetition of mistakes by IAS personnel. This visual aid is broadly employed by lesson leaders in technical training and during training exercises, and subunit deputy commanders for IAS use it when preparing for and conducting critiques.

Our engineers also consider the following factor during job-by-job control: The operating reliability of aviation equipment increases in response to improvements made in design and production. But this circumstance in no way decreases the attention afforded to control; instead, it forces the IAS personnel to relate even more seriously to it, so that the high reliability of the complex aviation equipment would be insured. In this case systems that have been found to be completely trouble-free over long periods of time are still checked following particular time intervals, particularly during maintenance opeations. Other systems which experience problems from time to time were placed under constant observation by our engineers.

Monitoring and measuring apparatus is acquiring an ever-increasing role in the work of specialists. The quality and effectiveness of control depends on its creative use. Much attention is devoted in our unit to insuring the accuracy of instrument readings. The instruments are periodically checked, and they are stored carefully. Lessons and training sessions on the use of monitoring and measuring instruments are regularly organized.

The results of control inspections are broadly reflected in visual aids--schedules, diagrams, posters, and tables. As an example the unit makes use of the well-composed schedule "Monthly Satisfaction of Aircraft Inspection Norms by IAS Executives," the "Schedule of Monitoring and Measuring Instruments and Tool Inspection by Unit Engineers," the "Aircraft Flying Time Log," and others.

Moreover there is a special clipboard at the workplace of each engineer. It bears memos to the maintenance group chief, the engineer's workplan for the month, and notes concerning everything that must be done to the equipment from a daily to an annual basis, and the responsibilities of subordinates.

Special apparatus is now extensively used to monitor the state of modern aviation complexes. In this connection specialists must have a deep knowledge of this apparatus, and they must use it competently. The objective monitoring classroom in the unit is being improved with these goals in mind. We also have an integrated trainer with which we can model certain failures, demonstrate them to the IAS personnel, and visually demonstrate changes in the craft's behavior in the air.

The electronic equipment engineers include monitoring the work of individual systems with monitoring and measuring apparatus in their personal daily work plans. By observing blips from the aircraft apparatus on screens, an engineer can objectively evaluate how well the aircraft is functioning, and on the basis of the obtained data he can make a conclusion concerning its readiness for flying. Daily use of the instrumental monitoring system has insured trouble-free operation of one of the important radiotechnical devices of the aircraft for a number of years.

Now that new directives have been introduced, engineers are turning special attention to organizing control over jobs performed by IAS specialists on aviation equipment. The problem of improving job-by-job control was discussed at the meeting the instruction methods council's engineering-technical section held prior to the start of the second period of combat training. There was a useful exchange of opinions on the sorts of jobs which have to be completed aboard the aircraft jointly by specialists from different services. As an example the linkage between the autopilot and the optical sight or between the radio altimeter and the speed and altitude indicators has to be checked jointly. As a result a decision was made to combine specialists representing associated services into a single production group, and in subunits where this was impossible, job-by-job control over the state of aircraft equipment was turned over to the chiefs of groups representing the associated specialties. They used onboard objective monitoring apparatus for this purpose. Thus the KZ-63 recorder is used to check the tightness of the total and static pressure systems, and the accuracy of readings given by aneroid barometers.

In order to raise the effectiveness of job-by-job control our efficiency experts developed and introduced a device for checking the quality with which the maximum temperature warning signal amplifier is tuned, and the operability of warning signal circuits without having to remove the amplifier from the aircraft. Another group of innovators is working on methods for monitoring the balance of gyro units in the AGD-1 gyrohorizon without having to remove it from the airplane. A special console was also adapted for this purpose.

Without a doubt the order of job control spelled out in the appropriate documents is observed unfailingly by our unit's IAS personnel. But aviation equipment operation is undergoing continuous improvement. That also pertains to job-by-job control. Its effectiveness and quality depend in many ways on the executives of the unit's IAS, the squadron deputy commanders for air force engineering service, technical maintenance unit specialists, and service group chiefs. Officers who organize control creatively and make competent use of modern apparatus are more successful at it.

However, there is no limit to the new. Much has still to be developed and introduced by our efficiency experts. Take as an example the problem concerning the "relationship between ground and sky"--the ratio between the amount of time the airplane flies and the amount of time devoted to preliminary preparation of the aviation equipment. Given the evolved practice of organizing and conducting flight shifts, the total time radiotechnical

equipment and airplane systems operate in the air is significantly greater than the amount of time they are turned on for testing at the airfield. Inasmuch as there is a certain proportionality between the working time and the number of probable failures, this may mean that the number of failures occurring in the air would be greater than the number occurring on the ground. How would it be best to forecast the behavior of the equipment in the air under such conditions?

Another problem is that of arisal of so-called "unintensively" or incompletely employed systems or operating modes of an airplane's radiotechnical apparatus. No less attention should be devoted to checking the readiness of such systems for flying, but the question as to how to do this more effectively will have to be answered by the innovators.

Constant inquiry, deep scientific analysis of the condition of aviation equipment, and introduction of new, progressive methods of its maintenance typify the style of our best engineers in their work on the complex and important tasks falling within the period of intense flight training. [009-11004]

11004
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TRAINING ACTIVITIES IN THE TRANSCAUCASUS DESCRIBED

Moscow SOVETSKIY VOIN in Russian No 16, Aug 79 signed to press 26 July 79 pp 8-12

[Article by Col A. Danilov and Lt Col L. Babayan, SOVETSKIY VOIN special correspondents: "We Serve in the Transcaucasus"]

[Text] The Transcaucasus: A region of mountain ridges and rushing rivers, flowering valleys and climate contrasts. In a day, it is possible to encounter here unbearable heat, subtropical humidity and the cold of high mountain areas.

The Transcaucasus region is indeed a distinctive one with the whims of nature. Hardened and strong willed lads serve here.

We will talk about some of them.

It is a Match for Armor

"Warrant Officer [praporshchik] Zheleznyy," the tanker presented himself and shook hands firmly.

It occurred to me: Nature had not treated the lad badly with its strength. Konstantin Zheleznyy was above average in height and broad shouldered. Having met him, anyone would say: Definitely a sportsman! Yes, Konstantin has a rating in weight lifting, swimming and volleyball.

Zheleznyy says: "Without sports, it is quite impossible for us, the tankers. Armor does not love the weak."

The other members of the crew, which is called in the unit an international one: Nikolay Orlov-- a Russian, Levon Marinashvili--a Georgian, Mecheslav Vitkauskas--a Lithuanian, and Konstantin Zheleznyy himself--a Ukrainian, are a match for their commander. Before his service in the army Zheleznyy was a metallurgist in Krivoy Rog.

His military comrades were also hardened by work before the army: Nikolay Orlov worked as an electrician in Rostov. Now, Orlov is the best mechanic driver.

And here is Levon Marinashvili--a metal worker from Rustavi. Now, he is the gun layer, a master of tank fire.

It is possible to say the same about Mecheslav Vitkauskas, a former lathe operator from Kaunas. The fighting man has become an excellent loader.

Zheleznyy says: "A cavalry regiment was stationed before the war in those areas where our tank range is now. My grandfather Sergey Ivanovich Zheleznyy served in this regiment. He went to battle from here. In Forty-Three, he did not return from a scheduled mounted reconnaissance...."

... It was still night when the tankers moved out for an exercise. Raising clouds of dust, the combat machines tore along. In their path, there were deep ditches, and steep ascents and descents with sharp turns.

The range. The volleys thunder. The fathers and grandfathers of these young men fired the same way more than 30 years ago when they became an armored covering detachment on the path of the enemy who were tearing the Caucasus apart.

The tankers had heard more than once from Hero of the Soviet Union Aleksandr Zakharovich Pirmisashvili about how the frontline soldiers had acted in battle. He was a participant in the battles for Smolensk, the Caucasus and the Urkaine. Many of his brother soldiers brought fame to the combat banner by their exploits. The tankers sacredly revere their memory. They are trying to be worthy of the glory of the heroes....

Tactical classes are in full swing. The "enemy" is putting up stubborn resistance. The crew commander receives the order over the radio:

"Suppress the firing point on Bezymyannaya Hill!"

There is an unforeseen obstacle in the way: a sharp--up to 40 degrees-ascent

Zheleznyy thought: "Will Orlov take this ascent, is his boldness and skill sufficient?" However, he immediately cast aside this thought. They had not trained a lot and tenaciously for nothing.

The machine clambered up with difficulty. The mechanic driver was quite strained. He carefully looked to the front but did not see anything except sky: The tank had literally reared up .... From the sound of the engine, Orlov sensed that the revolutions were falling and movement was slowing down.

He diagnoses: "This means the steepness is increasing. Allow a yawn, the slightest false step--the engine will die. This is very dangerous." Nikolay Orlov, without delaying a second, pulled the turning gear levers toward him and placed them in the first position. The traction of the driving wheels increased, and the tank climbed up the mountain. A jolt from the front part of the machine striking the ground and the barrier had finally been overcome, the test had been passed. The tank commander couldn't refrain from enthusiastically shouting:

"Good lad, Nikolay! You didn't let us down...."

Orlov is also happy. The target appeared. Private Marinashvili, the gun layer, destroyed it with the first round. The company carried out the combat mission successfully.

After the exercises, Warrant Officer Zheleznyy shared his personal plans.

The warrant officer said: "I would like to become an engineer."

Konstantin Sergeyevich thoughtfully looks into the distance as if he is sizing up the height to which he must go. Then, turning to me, he says:

"Do you know, I would like to build every machine: both those that will work the fields, those that will lay new roads, and those that are needed for the motherland's defense."

I looked into his eyes and thought: "It is cordial and happy to live and serve with those like Zheleznyy and his crew. These people have something in common with their powerful and formidable machines. And still there is persistency and skill plus will."

We Are Ordinary Lads

We are walking along a field covered with a long green tarpaulin. White nylon panels and red covers with stripes lay in even rows on this green. The packing of parachutes was taking place. Tomorrow, the airborne troops will jump.

Lt Vladimir Mironov tells us about the life and combat training of the airborne troops.

Mironov says: "We recently had an incident. Gennadiy Ivanov's main chute did not open fully during training jumps. There remained 300-200 meters to the ground..."

We shouted to him:

"The reserve! The reserve!"

But he somehow delayed. Literally at 100 meters, Gennadiy pulled the ring of the reserve chute. And he landed all right. Here is an individual's self-control! ..."

Vladimir Moronov, perhaps even deliberately, wants to emphasize what bold and desperate lads are in the unit. We halted near the parachute tower. Vladimir becomes even more animated.

"Meet Yuriy Platonov."

The jump biography of Sergeant Platonov is a rich one. He has more than 300 jumps to his credit.

"You ask whether it is difficult to be a parachutist?" Platonov smiled good naturedly.

"It is not so simple to answer that question. Of course, it is not easy to be an airborne fighting man. The strain on an airborne soldier during training, I would guess, is no less than an astronaut's. It is extremely more difficult to serve in our forces than, for example in the air force. Many specialists and doctors confirm this."

Different people come to the airborne forces. Each individual has his own character, loves, and abilities. However, one thing unites everyone--love for the motherland, a passionate desire to become a true airborne soldier. It must be confessed that sometimes those are encountered who seemingly have everything to become an airborne soldier but lack the mental power. Such a fellow shirks difficulties. However, with the help of commanders and comrades during training he wins the main victory in life--victory over himself, over his faintheartedness. He becomes a bold, decisive and skilful parachutist. Time will pass and you will ask such a youth whether he regrets becoming an airborne soldier. He will surely answer:

"No! I am simply lucky that I serve in the airborne forces."

... One after the other, the heavily loaded airplanes start. In the sky, they form up into a "V" formation. Soon, quite soon, we will be in combat.

Yes, from the sky--immediately into battle. We have scarcely landed when it is necessary to beat off a fierce "enemy" attack from the ground and the air. Hardly had we repulsed the infantry, and the tanks attached. It was a hot time. However, we carried out all the assigned tasks successfully. My friends--airbornemen Yevgeniy Kovalev, Sergey Krasil'nikov, and Nikolay Dubov particularly distinguished themselves.

For some reason they call us, the airborne soldiers, heroes. But in fact we are ordinary lads. True, our profession is different from others because we often encounter risk. Every parachute jump is a jump into the unknown, it is a check of self-control and of coolness.

Let the Soviet people know. We, the airbornemen are always combat ready.

A Launch in a Very Short Time

It seemed that summer in these regions had exceeded the limits of its capabilities--the sun shone with incredible strength. The range breathed the extreme heat. Despite the heat, the missilemen operate accurately and confidently.

The task--destroy an "enemy" missile subunit--had been assigned to the battery which Lt Anatoliy Potapov commands. Time was at a minimum. In combat training and during wartime, he, who forstalls the enemy, will win.

The engine started up and began to drone. The radio set's telegraph key began to rap with short rapid beats. The computer instruments began to whirr. The topographers bent over the maps. The first initial data are already arriving. Numbers, numbers, numbers.... Pfc Mikhail Torshin's hands, which are accustomed to the equipment, lay on the complicated instrument. The instructions of the crew chief follow one after the other.

Here--at the tensest moment--is the next input:

"The officer has been put out of action!"

Komsomol member Torshin turned to his assistant, Anatoliy Syrovatkin--a new soldier:

"We will work independently!"

The voice of Private First Class Torshin sounds out confidently and clearly:

"55 degrees, 15 minutes...."

Displacement.... Control....

The missilemen operate without fuss and calmly. And here comes the most critical moment--aiming the missile at the target. Private Slepnev determines the aiming data and quickly reports them to the computer men who make calculations and pass them to the battery commander. The officer checks the actions of the subordinates and makes a decision.

On the instructions of the battery commander, Private Yevgeniy Neyelov, the operator, introduces the combat range into the calculations. He spent considerably less time on performing this operation than is prescribed by the norms. It is not without reason that Neyelov has achieved the rank of specialist firstclass.

The operator reports: "Ready!"

The commander counts off the time and keeps his eyes on the instrument's test light. Again valuable seconds are won from the norm. The officer is satisfied: The operator, as always, is on top.

"Take shelter!"

The missilemen are blown away from the position as if by a wind. They take safe shelter in in a specially dug slit trench.

"Launch!"

The missile broke loose from the guide rail and left a blinding trail behind it. Thunder spread on high and then everything quieted down. Lieutenant Potapov tiredly rested against the armor and closed his eyes.

"Target."

The task had been carried out in an excellent manner. Using the results of the missile strike, the tanks rushed to the "enemy's" positions. A fierce battle flared up. After some time, the order came to move to a new position area. The "enemy" was massing reserves, trying to close the gap in his defenses.

Again a swift move, again strenuous work. The fighting men worked selflessly and operated like they were in a real combat situation. They exceeded even the excellent norms.

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ACTIVITIES IN DIVER TRAINING SCHOOL NOTED

Moscow SOVETSKIY VOIN in Russian No. 18, Sep 79 signed to press 28 Aug 79 pp 9-12

[Article by Sr Lt S. Ishchenko and I. Kurashov: "Toilers of the Deep"]

[Text] From here, from these shady avenues muffled in thick greenery and similar to the tidy roads in a botanical garden, the sea is not visible. It is only heard at a quiet time as the breakers sound incessantly somewhere in the distance--yes and sometimes the commands, muffled by the distance, of those standing near the berths of the ships. Then, it seems that the twisting path climbing among the squat bushes was only the beginning of the path--the beginning of the road to the sea....

...What does an individual, who steps into the depths for the first time, experience? Happiness because of the knowledge of the unknown? Perhaps, timidity before it? Undoubtedly, to a certain degree there is both one and the other. Only, there is no fear. This could have been definitely mentioned when he was on training dives at the diving training ground. The young sailors have been prepared for these first steps by all their preceding, though still brief, service; and by experienced teachers and instructors; and by the entire military indoctrination process in the training subunit.

We were lucky. On the day we arrived at the diving training ground, PO 1st Class V. Karakaya's relief was preparing for the first dives. The young divers were checking hoses, signal lines and equipment.

Smn D. Tramboukin, I. Ageyev and Yu. Nikulin were the first to put on the diving outfits with the help of their comrades. The command rings out:

"Divers, to the trap!"

The traditional parting clap on the shoulder--and one after the other the fighting men disappear under water. Myriads of air bubbles escape noisily to the surface. The check for airtightness is finished. Now, it is possible to go to the bottom.

Students I. Pivtorak and V. Berestov, who are supporting the dives, are extremely watchful. Using the safety line, each one of them maintains communications with "his" diver and transmits the necessary signals to him on order of the director.

The classes were taking their normal course. Having convinced himself of the normal work rhythym, the diving director complicated the situation. He gave an input on helping a comrade who had gotten into trouble on the bottom. A short time was allotted for the preparation of the insurance diver; however, the young sailors coped accurately with their task.

Petty Officer 1st Class Karakaya's relief is the best in the unit. The sailors serve in the subunit which Capt 3d Rank N. Khorun commands. The experienced diver, who has worked quite a few hours on the bottom, skilfully instills in subordinates the skills necessary to a future naval diving specialist: boldness, courage, and hardiness. The students compete for progressive unit in the KCHF [Red Banner Black Sea Fleet]. The following is the slogan for each day in the training of the young deep sea divers: "Solve all combat training tasks and practical dives only with high ratings."

Besides courage and strong nerves, the diving profession also requires thorough knowledge from sailors. Every condition has been created here by the hands of the enthusiasts. Let us take the study room for mine and torpedo affairs which Warrant Officer [michman] Slesarev manages. In it, the young sailors master the fundamentals of demolition work, the construction of ammunition, etc. A programmed training system, which permits the effectiveness of the training process to be raised considerably, has been set up in the study room. Everything here strikes one with its thoughtfulness and simplicity of technical solutions.

Thus, a minimum of time is required for interrogating students: equal to as much as is allotted to one fighting man for the search for a correct answer. A mistake is ruled out: The electronic system always rates the knowledge of the students accurately and the appropriate rating lights up on the panel in front of the instructor. The reserve of time, which crops up, is used for a more thorough mastery of the topic.

The operating creative group under the direction of Capt 2d Rank G. Mironchenko is constantly engaged in improving the training base. It consists of the most experienced officers and warrant officers who have undergone hard diving service. Among them are unit veterans: senior instructor of the diving study room WO S. Mikhaylov who completed this school in 1939, and WO's P. Svyrev and F. Pereshivaylo.

WO V. Zadorozhnyy has introduced quite a few valuable streamlining proposals. He has served for almost 20 years in the fleet. He has more than 50 streamlining proposals and improvements to his credit. Among them are a trainer for the performance of practical work by the student divers under water, a new type of lock for fastening the belts of diving gear....

Valentin Ivanovich tests his improvements himself. The experienced welder diver has more than 3,500 hours underwater to his credit.

... A diver! At times, it can seem to uninitiated people that this is an individual who works in the depths on examining and raising sunken ships. This notion comes from the field of several movies and adventure novels.

A modern military diver is an underwater general specialist. He must know and be able to do a lot: to close up a hole; perform a preventive inspection of a ship's hull; be familiar with anti-mine affairs, underwater repairs and welding, and--finally with the methods for helping a submarine crew which has suffered an accident.

All this is taught to the strong young lads and the students of the subunit about which we have told you.

PHOTO CAPTIONS

1. p 9. Vyacheslav Kolpakov, Viktor Fedan and Aleksey Pronin, students and Komsomol members, are ready to go into the depths.

2. p 9. Actions upon the input: "Hole in a compartment."

3. p 10. Smn Aleksandr Ulis inspects equipment.

4. p 10. Before submerging.

5. p 10. There is no easy work under water.

6. p 11. Smn Aleksandr Foya, a Komsomol member considers: "A diver is an excellent profession!"

7. p 11. PO 1st Class Aleksandr Uvarov, a diver, gives a parting word to a student before a dive.

8. p 12. Sr Lt Petr Poddubnyy, the commander of an excellent training platoon, talks with young divers.

9. p 12. WO Leonid Slesarev conducts classes.

10. p 12. The room of combat glory. Young sailors listen attentively to the story of frontline WO Sergey Mikhaylovich Mikhaylov about the combat work of divers.

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RECOVERY OF SUBMERGED COMBAT VEHICLE DESCRIBED

Moscow SOVETSKIY VOIN in Russian No 16, Aug 79 signed to press 26 Jul 79 pp 26-27

[Article by Sr Lt N. Zubtsov: "A Continuation of Combat"]

[Text] Here it is, it is an ill-starred place.... Who would think that here, in a forest, a swamp was concealed under a frozen snow crust which seemed firm to the eye? The infantry fighting vehicles had left their traces here. They had passed, but a self-propelled air defense mount disappeared. It was good that the men managed to jump out.

I and Warrant Officer [praporshchik] Sidenko stood near the unfrozen patch of water which was already closing up and we recalled how the self-propelled mount was rescued from its watery captivity. More correctly, Sidenko recalls and I listen and ask questions....

I asked Vladimir Andreyevich: "You went first.... Perhaps you do not trust your students?"

He was surprised: "What's the matter with you? It is impossible not to trust people whom you have taught yourself. There is something else here.... Water is a blind force. At times, it is insidious. Why risk the lads? I have had more to do with water than they have."

There is more-- "in all" twelve years of diving work! A total of 2,000 underwater hours. In other words, Vladimir Andreyevich had performed his military work in an underwater kingdom for 80 days and nights.

Vladimir Andreyevich continued his story: "It was quiet and frosty in the forest. Thirty degrees. In such weather, underwater dives are rather dangerous to the life of divers. Each one of us knows this. However, if it is necessary, it is necessary.... I asked Lieutenant Rozin: 'Will you permit me to prepare my diving gear?'

"The platoon commander asked me in his turn: 'And who will be your insurance?' As is known, a lot depends on the insurance diver. It happens that the very life of the one who goes into the depths depends on him. I suggested Pfc Aleksandr Shutolev. He had also been a diver before the army.

"And here I am going under water. I go and under my feet--emptiness.

"'How many meters to the bottom?' I think because my rubber suit presses all the more closely to me. The swamp was somewhat strange.... A half meter of ice; under it up to a meter of water, and further down my feet rested on something firm, I could in no way pick out on what. I guessed--it is peat! I found a trapdoor by groping in it--a sign left by the self-propelled mount which had disappeared. 'This means, it is somewhere here, in this mess', I thought, rummaging all around with my hands. However, I was mistaken. A ragged line, one end of which remained above and whose other the mount had taken with it like a guide, led me to a broken hole in the peat floor.

"I reported up above with a signal rope: 'I have not found the equipment yet. I am continuing the search! From above, I received: 'Good'. What is there, under the flooring? I quietly climbed into the hole in the peat. Here, it was completely in the shadow. I extended my palm to my eyes--I did not see it. I closed my eyes for several seconds--it was somewhat easier. My heart was thumping as in a marathon....

"But where was the machine? It was good that I had the rope in my hand. It led me from the peat manhole where the thickness wasn't large or small--more than three meters. I poked with my feet but there was no bottom: there was more water under the cushion of peat. I lowered myself ever lower and lower. Fury and even athletic excitement gradually took possession of me. I thought: 'Cut in! Nevertheless, I will find it!' However, I immediately ordered myself to moderate my ardor. A diver must work with a cool head. Otherwise, he will not be able to control each of his steps and each of his movements accurately. It is not far to misfortune.

"Above they demanded: 'Report about yourself.' I answered: 'I am continuing the search'. What else could you say?

"The depth increased and increased. 'What's this, there is no bottom? ....' I begin to get angry. The pressure in the diving suit increased. At times, it was necessary to stop in order to get used to this or something else--as the psychologists say, to adapt.

"When there was 18 meters of thickness over my head, I decided: 'I will descend a little more--and then up.' 19... 20... 'that's all! Time to ascend'. And suddenly I rested my left hand on something solid. It was it, the self-propelled mount. I immediately let the surface know. I inspected the equipment by feel. Ascending, I said to myself: 'You, my friend, are a little far away. You are perched. It will be necessary to take plenty of trouble with you. There is no way to get near you.'

"on the land, I reported what and how to the lieutenant. We decided to extract the heavy machine using tank cables. However, it was necessary

to catch them on the hooks. And here I am sitting on a track. I am resting and thinking about how I can slip the loops of the cables onto the hooks. On land, it is a simple task; here, at a depth of 20 meters, in complete darkness, it is something else.... And to make matters worse, the self-propelled mount was not in a very suitable position for the operation.

"I rested. And again--to work. I crept under a hook and adjusted the first loop. From one side--it didn't work well. From the other--also no way. The loop did not want to seat on the hook and that was all there was to it.... I was becoming hot. I signaled to the ground: lower the rope more! They lowered it. However, they overdid it--about three meters too far. I had trouble with them, these meters, and did not notice that I almost went up to my knees in the silt. I stretched out my hand, I wanted to catch hold of the mount but ... it wasn't there. This threw me into a fever. What's this mysticism.... In the depths anything comes into one's head. Under the wool sweater, I felt the cold sweat stream down. Like a blind man, I stretched my hands to the front and separated them to the sides. And ... I came across complete and absolute darkness.

"It was as if the mount was playing hide-and-seek with me, having entirely concealed itself in two meters. I then messed about with the cable for a long time: The loop slid from the hook every time. When my strength was practically zero, it yielded....

"Thrusting myself from the clear water up to my waist, I raised my head and saw bent over faces. Suddenly, they, these faces, began to sway and run together... I lacked the strength to unscrew the valve unit and report: 'Ready'.

"Two prime movers extracted the sunken machine. Everything was going well. However, some one shouted: 'The left cable is wearing out!' Stop! What to do now? They didn't want to risk it. They decided to replace the unreliable cable.

"I went to the bottom of the lake again. I replaced the cable in an already familiar situation. I ascended up and did not suspect that new insidious tests awaited me on this 20-meter trip to land.

"I felt my helmet suddenly rest against the roof of peat. What's this witchcraft--here was the hole. Where is it? I look for the manhole but it's not here. I give the command to pull me harder--perhaps with the help of my comrades I will make a path for myself literally with my head. The ground for some reason is silent. I signal again. Again, silence, the manhole has finally been battened down--the signal rope also. I did not experience fear in the struggle: I believed that everything would come out alright. Faith and hope in my comrades was strong--they would

not leave my in trouble. This confidence supported my psychological steadfastness. Something else worried me. Was there sufficient oxygen while I looked for an exit? Survive or not suvive, it was necessary to act! I reached for my knife and began to chisel at the curtain of peat."

... I listened to the warrant officer's story and thought: If Vladimir Andreyevich lost his confidence in himself and his comrades during those terrible moments, he would remain there, on the bottom, forever. This is what strong moral tempering means!

More than once Warrant Officer Sidenko had to look for and find a way out of a very critical--and at first glance very hopeless- situation. It is very important for a diver to be able to evaluate the situation instantly and make the only correct decision in an instant. The depths do not excuse a mistake! There is no one to consult with there, in the underwater loneliness.... Everything must be decided alone. The self-control and coolness,developed over the years, had never led him to a stressful state or psychological shock. They are extremely useful everywhere and more so in the depths.

... Chiselling with a knife at the frozen block of peat--it was this that had battened down the manhole--was unbearably difficult. However, Vladimir Andreyevich chiselled, chiselled, chiselled .... When it became quite unbearable, he permitted himself to rest and then he spent a lot of time again with the knife. The crater in the roof of peat grew slowly, very slowly. Finally, the signal rope came free.... already this was almost a victory.

"I immediately asked the ground. I gave the command: 'Pull' They received the command up above!"

"When they helped me to get out of the hole in the ice, I was as in a dream. Only now I felt that all my strength to the last drop remained there, under the armor of peat. We had extricated the self-propelled mount."

... One of these days, these normal work days, Vladimir Andreyevich will return home with a new watch - an award of the district commander. He will simply say to his wife and children: "For service."

It is only from neighbors, from the husband's service comrades, that Warrant Officer Sidenko's family will find out for what service. Nevertheless, the people closest to Vladimir Andreyevich will not be able to imagine how much he endured during those short but long minutes and hours.

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COMMANDANT OF MOSCOW ON SERVICEMEN'S BEHAVIOR

Moscow SOVETSKIY VOIN in Russian No 16, Aug 79 signed to press 26 June 79 pp 37-40

[Article by Lt Gen V. Serykh, military commandant of the city of Moscow: "On Guard Over Military Order"]

[Text] From its very establishment in 1918, the military "komend atura" of the city of Moscow has been actively occupied every day with questions on strengthening discipline and maintaining order and organization among the servicemen in our motherland's capital as well as with a number of other tasks.

With the passage of time, the headquarters provost and security service work forms and methods underwent changes to some degree; however, its principles remained basically unchanged and Leninist: the combination of strict exactingness toward servicemen with a respectful attitude toward their honor and dignity. Now, we are steadfastly guided in all our work by the wise Leninist precepts about maintaining highly conscientious military discipline and by the instructions of the Communist Party of the Soviet Union on strengthening the country's defensive capabilities.

* * *

Daily a large number of soldiers, sergeants and officers go out on the streets of Moscow beyond the limits of their unit--on temporary duty, to perform special assignments, on city leave, and on furlough. If you also consider all those who must pass through the capital on a trip, then an impressive number is received. It is necessary to work with all these people who are--if one can express it this way--only under the control of their own conscience. It is necessary to work on a broad scale and in several directions at once.

A patrol walks along the street. It is composed, for example, of an officer and two soldiers.

It is simply impossible to pass by them without staring at the well-knit figures, the immaculately tucked in uniforms, and the faces shining with some special charm. They are performing the responsible task of maintaining military order and discipline, they see everything and note everything.

Enlisted men, sergeants, students, warrant officers, and officers meet. The clear mutual greetings automatically attract the people's looks, compelling them to be permeated again and again with a sense of respect for the people to whom the motherland has entrusted the defense of its sacred borders, and to take pride in the fact that highly cultured and disciplined fighting men serve in our armed forces.

However, a soldier with a service cap pushed to the back of his head and in an unbuttoned tunic appeared in the stream of city dwellers. The officer says: "Conrade soldier! I am the chief of the patrol. You are violating uniform regulations!" And leads the offender to the side....

Such episodes are infrequent but they do happen on the capital's streets. The most widespread cause of them are violations of the rules for wearing uniforms. Now, you do not often meet on the streets or in public places a serviceman dressed slovenly or untidily. Our uniform has become comfortable, of good quality, and beautiful. However, something else has begun to be observed--an inclination to dandyism: cut out or too narrow trousers, non-regulation shoulder-boards, and different ornamentations. Working with servicemen who commit this type of violation requires searches for new forms and methods of influence. But I will talk about them below. Now, I would like to recall at this time another wide-spread fault. This is the so-called "sketching from nature."

Sgt V. Tsigankov, on furlough in the city, saluted a major correctly and in accordance with all the rules of drill science. When meeting a lieutenant, the fighting man did not have such sprightliness in his actions. And, in general he did not salute a warrant officer. Unfortunately, Tsigankov is not alone. It is possible to meet other sailors and soldiers who do not salute sergeants and master sergeants, not to mention those equal to them in rank. Such fighting men display not only their unmannerliness and low standards but also make quite an unpleasant impression on bystanders. The lines in a letter from Jr Sgt A. Benbig's mother are involuntarily recalled: "It is very pleasant to observe how fighting men salute each other", it says in it. "My son arrived on leave. I was walking with him along the street--my heart was happy and overflowing with pride. A soldier saluted him and he returned it. I asked: 'Do you know that lad?' My son answered: 'No, Mama, I do not know him." I thought: Both of them are soldiers in one army--our Soviet army. How could they not respect each other?"

Very good words. You cannot say better it seems. It is bad that all fighting men still do not recognize the importance of rendering a military

salute and all commanders are not imbued with a sense of responsibility for instilling this element of military ethics in their subordinates. There are sufficient positive examples for imitation in this. I will cite only the experience of one of our garrison's units where Officer I. M. Chernukh serves. A well adjusted uniform, correctness in performing drill manuals and saluting, courtesy, and standards of conduct always distinguish the soldiers and sergeants in this unit. In the city, they evoke the respect of the Muscovites by their smart appearance, neatness, courtesy, and irreproachable conduct in public places. This occurs because from the first days of service skills in wearing a military uniform and caring for it are inculcated in the young fighting men and they are taught correct carriage and standards of conduct everywhere and always.

I would like to emphasize the last words--always and everywhere. This means, not only in formation and not only in the subunit's disposition area. A serviceman must demonstrate high discipline, vigilance and neatness outside the unit also.

In our view, this stress in indoctrinational work is very important. In a military camp, a soldier's conduct is regulated by the entire system of military service and the daily schedule, commanders and chiefs watch him, they teach him, they indoctrinate. Here, it is necessary to add public forms of influence and other preventive work methods aimed at eradicating violations of discipline and order. Outside the unit, on leave in the city, each of the servicemen is left to a large degree to his own resources. His conduct is basically only checked by the garrison patrol of the military "komendatura."

For this reason the effectiveness of our work must be particularly high. It demands not only industriousness, initiative and independence from the detail when carrying out its service duty but also complete good breeding, tact, and the ability to conduct oneself correctly in each specific situation. Everyone knows how attentively people look at a patrol or VAI [Military Motor Vehicle Inspectorate] inspector. His conduct, neatness, and smart appearance must serve as an example for all servicemen.

From this, it is understandable how highly our indoctrinational work with soldiers, sergeants, warrant officers (praporshchiki), and officers on instilling in them military courtesy and the ability to approach not only one senior but also those equal and junior to them in rank tactfully and to give a timely reminder and comment must be placed and set. The prevention of a delinquency depends a lot on the patrol's good breeding and skill.

In this respect, Pfc Yu. Kirimet'yev, Pvt N. Gruba, and other fighting men, who perform the duties of a patrol conscientiously, deserve a word of thanks. They never overlook violations of discipline, and they are able to put them in order correctly, without violating tact and destroying human dignity.

Besides everything else, watchfulness and resourcefulness are necessary for a patrol. While performing duty in one of the capital's squares, Pfc D. Onayko paid attention to an individual who was behaving suspiciously, glancing uneasily around. The private firstclass boldly stepped up to him. The detainee turned out to be a fugitive from justice because of a crime.

However, this, of course, is an unusual case. The main task of patrols and VAI inspectors is the maintenance of exemplary order on the streets and roads of Moscow. Various influence measures, including two- hour classes during which the detainees study the appropriate articles in regulations, rules for wearing uniforms and saluting, and other elements of military etiquette under the leadership of the most experienced instructional methods officers: Frequently in subunits, these soldiers and sometimes even commanders do not pay the necessary attention to them.

Here, we have come to one of the most important avenues in our work--the prevention of violations of military discipline. So that there will be fewer crimes, it is necessary to eradicate their causes. This requires time, purposeful efforts and systematic work directly in the units and subunits of our Moscow garrison. This work is acquiring an ever broader scope. The officers of the military "komendatura" regularly appear before various categories of servicemen with a profound analysis of crimes, their causes and those people that give birth to them; publicize the positive experience in indoctrinational work which has been acquired in progressive units; and explain requirements in the regulations and orders of the USSR Minister of Defense.

Since the year before last, we have conducted and are successfully applying one more method of preventive work which has found broad support among the garrison's command element and personnel.

A club for publicizing the rules for wearing uniforms and combined arms regulations has been established by the initiative and creativity of the military "komendatura's" officers, warrant officers, sergeants, and soldiers. In it, the history of the development of military uniforms, beginning with the 17th Century, is traced with the help of numerous exhibits. It also has a hall for giving lectures and reports, holding discussions, and showing films.

Officers, warrant officers, sergeants and soldiers from the garrison come to us on orders from units based on a plan worked up by the instructional methods council. Classes which include familiarization with the history of military uniforms and the development of their separate elements: shoulder boards, tabs, outer clothing, etc., are conducted with them. Besides this, one of the deputy commandants presents a brief report on the status of discipline and the role of the fighting men of this unit, establishment and military training institute in strengthening it. In conclusion, training films are shown.

These classes take the specifics of the audience into consideration. Thus, for example, the garrison's VAI chief or one of its officers speaks to drivers. A detailed analysis of violations of safe driving rules and a critique of the reasons which gave birth to these or other incidents are given. Of the films, "The Driver and the Road" is shown most frequently of all.

As a rule, such classes make a large impression on the fighting men; not a one of them remains indifferent. After visiting the propaganda club, Private Uvarov said: "I never thought that the history of military uniforms was so rich... I will remember for a long time the narrative about violations of military discipline by drivers. It teaches a lot!"

Other forms and methods of preventive work are also used in the work of Moscow's military "komendatura"; however its effectiveness directly depends on the state of affairs in the garrison's units with respect to the military indoctrination of personnel. This problem is very large and multifaceted and connected to a large degree with the skilful and persistent implementation of the CPSU Central Committee's decree, "On Further Improving Ideological, Political and Indoctrinational Work." It is no secret that the formation of strong military discipline and the inculcation of irreproachable conduct and firm habits in always acting as the law, oath, regulations, and orders of commanders demand, are possible only on the basis of the people's high consciousness and their deep communist convictions. The solution of this task is achieved by the entire system of combat and political training and military indoctrination and by a strict tenor in army and navy life. The formation of self-discipline and the ability to control one's actions, to demonstrate self-restraint and self-mastery and to evaluate one's actions self-critically, means a lot here. The majority of the fighting men in the capital's garrison strictly follow these good rules. They carefully preserve their honor and the honor of the subunit. However, annoying exceptions are still encountered.

Pvt. A. Barukh was detained by a patrol for violating discipline. In itself, the incident was unpleasant. And not only that, the soldier was in a drunken state. They began to find out how it had happened and why. One detail, which troubled us very much, was ascertained. It turned out that, having served for almost one and a half years in the capital's garrison, the soldier had not once visited a single museum in Moscow.

This, of course, is an unusual case, but it causes one to prick up one's ears. It seems that it is useful for commanders and political workers to talk with soldiers before allowing them to go on leave and tell them about the capital's sights--and to do this so that people will have a desire to see the outstanding treasures of our culture with their own eyes. Then, coming off leave, a fighting man will feel spiritually richer.

Briefly speaking, I am talking more fully about using the capital's cultural riches and its very broad opportunities for indoctrinating

fighting men and raising their consciousness and discipline. Many commanders and political workers are doing this skilfully.

In particular, the military construction personnel, whom officer Ya. Svetashov commands, can serve as an example. Discussions about the capital, its museums, exhibitions, theaters, and cultural memorials are often conducted here with the troops. Communists and Komsomol aktivists take continual interest in how soldiers spend their city furlough, and it is no accident that senior soldiers go with the young fighting men on furlough. They often take upon themselves the role of excursion guide. Incidently, this is one of the reasons that the subunit occupies one of the first places in the garrison based on the state of military discipline.

If we could manage to pull all units and subunits up to the level of the progressive ones, then the honorable task--to make the capitol's garrison an exemplary one based on the state of military discipline, organization and order--would be solved.

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